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THE LAKE-DWELLINGS

OF

EUROPE.

THE

LAKE-DWELLINGS

OF

EUROPE:

LIB
OF
BO
BRA
OF
ROYAL ASIA

BEING THE

RHIND LECTURES IN ARCHÆOLOGY
for 1888.

B 2718

BY

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"ANCIENT SCOTTISH LAKE-DWELLINGS OR CRANNOGS."

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PREFACE.

THE Society of Antiquaries of Scotland, in offering me the Rhind lectureship in Archæology for the year 1888, left me no choice of a subject, as they had already suggested that the course should be on the "Lake-dwellings of Europe." Their communication embodying this proposal came upon me with complete surprise, and, indeed, it was with considerable misgiving that I pondered over the undertaking, because at that time I had no special knowledge of lake-dwellings beyond Scotland. But the kind encouragement of friends and the fact that I had two years to collect the necessary materials, ultimately overcame my scruples; and so with the acceptance of this appointment the work now offered to the public may be said to have been begun. My first and almost immediate step was a hasty run to the principal centres of lake-dwelling researches in Europe, so as to get a preliminary idea of the best and most practical way of carrying out this work. It was only then that the magnitude of the labours I had undertaken dawned upon me. The relics from the more important settlements, with few exceptions, were so widely scattered that, to form an intelligible notion of the civilisation and culture of their inhabitants from a study of their industrial remains, scores of museums and private collections had to be visited. Nor was the condition of the literature and records of the various discoveries more favourable to my purpose. The successive investigations by different parties in the more prolific stations were constantly altering the previous records and, in some instances, even falsified the earlier deductions founded on them. Again, descriptive notices were directed more to illustrate the particular and rarer finds of the investigator than to convey to general readers a fair estimate of the *tout-ensemble* of any special station. Keller's earlier reports were really exhaustive monographs, but by-and-by the subject became so extensive that to carry out the work on the same scale would entail the publication of many volumes. In 1866, when Mr. Lee translated and arranged Keller's first six reports, his work was fairly representative of the progress then made in lake-dwelling researches; but to keep pace with this progress a second edition at the end of the following decade assumed the magnitude of two large volumes.

Since then, however (1878), the results of lacustrine researches have been greater and more important than during any previous corresponding period. The "Correction des Eaux du Jura," together with various harbour alterations in the lakes of Zürich, Geneva, etc., have been the means of enormously increasing the lacustrine collections of Switzerland. In North Italy not only have new and remarkably interesting lacustrine stations been discovered and exhaustively investigated, as Lagozza and Polada, but the researches in the terremare have been such as to entirely alter the previous opinions held in regard to them. Nor has the progress in this field of research in many other countries in Europe been scarcely less important, in proof of which I have only to mention the additions made to the Scottish and Irish crannogs; the curious fascine structures brought to light in Holderness, Yorkshire; the novel revelations extracted from the *terp* mounds in Holland and other low-lying districts on the coast of the German Ocean; the greatly extended and more accurate details of lacustrine structures in North Germany; the discovery in Hungary of prehistoric mounds analogous to the terramara deposits of Italy, etc. In short there is hardly any corner of the lake-dwelling area in Europe which has not yielded new materials, throwing more or less light on this strange phase of prehistoric life.

In these circumstances I resolved to proceed *de novo*, and to construct my story of the lake-dwellings from whatever trustworthy sources I could lay my hands on. In order to carry out this intention my wife and I perambulated the whole of Central Europe with note and sketch books in hand, visiting, as far as practicable, the sites of lake-dwellings, and searching museums and libraries wherever we thought their relics or records were to be found. The eastern limit of the region thus visited may be represented by a line drawn from Königsberg to Trieste, passing through the intermediate towns of Krakow, Buda-Pesth, and Agram. The materials brought together from within this area are, to a very considerable extent, absolutely new to British archæologists. Of course, in a work which aims at putting into the hands of general readers an epitome of the essential facts and results of lacustrine researches since these singular remains were discovered in Europe, I had to take cognisance of some investigations that have already been fully recorded and illustrated. As it was impossible to illustrate typical groups of objects from all the lacustrine stations, I have, as a rule, in selecting the illustrations for this work, avoided those that have already come within the reach of English readers through the translation of Keller's works, except when they belonged to stations that are the best or only representatives of their kind in their respective localities—as, for example, the Rosen Insel in the Lake of Starnberg. Acting on this principle, I have given very few illustrations of objects from Nidau, Moosseedorf, St. Aubin, Wauwyl; nor, for the same reason, is a prominent place given to the earlier discoveries at Robenhausen, Estavayer, Concise, Cortaillod, etc. In this way I have endeavoured to combine in the work now issued as much novelty as possible, without detracting from its general and comprehensive scope.

As our peripatetic labours drew to a close, the next point to be considered was the method of grouping the materials under six divisions, corresponding with the prescribed number of lectures. This was by no means an easy task, as neither the geographical distribution, nor the historical order of the discoveries, could be exclusively selected as a cementing element in dealing with remains so diversified in character and of so wide a range in space and time. The plan which I have here adopted seems to me to combine the greatest advantages with the fewest drawbacks. Its rationale is as follows:—After introducing my subject by a short account of the circumstances that led to the discovery of the *Pfahlbauten* in the Lake of Zürich, and glancing at the archæological importance and surprising results of this discovery in other Swiss lakes, the historical element is dropped, and I conduct my readers over Western Switzerland and Savoy, summarising the discoveries in the successive lakes as we move along. In the second lecture we again start near the same place and continue our explorations in an easterly direction, and having examined the Upper Rhine district we cross over to the great Danubian basin, which we follow downwards as far as the lacustrine trail carries us, and ultimately finish with Laibach near the source of the Drave. The third lecture is entirely occupied with the palafittes and terremare in the Po valley. In these wanderings we have virtually made a circuit of the great Alpine chain of mountains, and have seen that the habit of constructing lake-dwellings was prevalent in the upper reaches of the four principal waterways which diverge from its flanks, viz. the Rhine, Rhone, Danube, and Po.

The lake-dwelling area thus surveyed comprises all the remains that can unequivocally be said to belong to the primary development of these structures in Europe, their period of existence being almost exclusively confined to the prehistoric ages of Stone and Bronze. Such being the case, this might be a suitable opportunity for offering some general remarks on the culture and civilisation of their inhabitants; but this I defer to the final lecture, thinking it preferable before doing so to acquaint my readers with various details of analogous remains brought to light in other districts in Europe. Accordingly in the fourth lecture we continue our geographical wanderings. Again starting in Switzerland we discuss the peculiar remains found in La Tène, almost the only exception to the ordinary *Pfahlbauten* of the Stone and Bronze ages encountered in our previous tour; and thence, moving northwards by the lower Rhine district, we pass to North Germany, where we meet with settlements apparently belonging to all ages. The fifth lecture is exclusively devoted to an exposition of the crannogs and lake-dwellings within the British Isles. In these five lectures we have thus surveyed the entire area in Europe in which the remains of ancient lake-dwellings have been discovered in modern times.

Excepting the well-known reports of Keller and a few monographs on particular stations or districts, the entire literature of the subject may be said to lie buried in the Transactions of learned societies. Having to hunt up and peruse most of these obscure and almost inaccessible articles—the number and extent of which may be estimated by a glance at the accompanying bibliography—it occurred to me that, by tabulating all the works and notices of these researches in chronological sequence, under the names of their respective authors and with correct references to their published sources, I might be conferring some benefit on future investigators, while supplying myself with a simple and ready means of referring to authorities, without the necessity of having to repeat over and over again the voluminous titles of publications. Hence the origin of the bibliography appended to this work, which, however imperfect, will, I trust, considerably enhance its value. Its compilation has given me a great deal of trouble, and the only valuable assistance I derived from other publications of the kind was from Pigorini's "Bibliography of Italian Archæology," which, unfortunately, comes down only to 1874.

There remains now only the pleasant duty of thanking those who have assisted me in bringing the work, so far, to a satisfactory conclusion. On this score my obligations are very great.

(1) In collecting the materials on the Continent my work was greatly facilitated by introductory notes from and to eminent archæologists, and among those who so honoured me I have especially to mention Evans, Franks, Voss, Tischler, the late Karl Deschmann, Major Tröltsch, Pigorini, and Castelfranco.

(2) To the custodians of museums and the owners of private collections I am indebted for permission to have notes and sketches taken of objects in their possession. The collections which have supplied me with original illustrations are the following:—

MUSEUMS.

Aix-les-Bains: *Musée de la Ville.*
Annecy: *Musée de la Ville.*
Avenches: *Museum of Roman Antiquities.*
Bâle: *The Museum.*
Belfast: *Antiquarian Museum.*
Berlin: *Märkisches Museum. Königl. Museum für Völkerkunde.*
Berne: *Cantonal Museum. Gross Coll. Federal Hall.*
Bienne: *Schwab Museum.*
Boudry: *Museum.*
Chambéry: *Musée de la Ville.*
Como: *Museo di Como.*
Constance: *Rosgarten Museum.*
Dublin: *Museum of the Royal Irish Academy.*
Edinburgh: *National Museum of Antiquities.*
Frauenfeld: *Sammlung der Hist. Gesellschaft im Thurgau.*
Fribourg: *Musée Cantonal.*
Friedrichshafen: *Museum des Vereins für die Geschichte des Bodensees.*
Geneva: *Musée Archéologique.*
Isola Virginia: *Museo Ponti.*
Klagenfurt: *Das Historiche Museum des Rudolfinums.*
Königsberg: *Das Prussia Museum.*
Laibach: *Landesmuseum.*
Lausanne: *Musée Cantonal.*
Leeuwarden: *Museum van het Friesch Genootschap.*
London: *British Museum.*
Lucerne: *Historical and Art-Industrial Museum in the Rathhaus.*
Mayence: *Sammlung des Stadt und Alterthumsvereins.*
Milan: *Museo Civico.*
Modena: *Museo Civico.*
Morat: *A small Collection in the Gymnasium.*

Munich: *K. Ethnographisches Museum.*
Neuchâtel: *Musée Archéologique.*
Parma: *R. Museo d'Antichità di Parma.*
Posen: *Archæological Museum.*
Reggio: *Museo Civico di Reggio d'Emilia.*
Rome: *Museo Preistorico.*
Schwerin: *Grossherzogl. Alterthümer Sammlung.*
Sigmaringen: *Fürstl. Hohenzollern'sches Museum.*
St. Germain (Paris): *Musée National.*
Stuttgart: *K. Kunst- und Alterthums-Sammlung*, and *K. Naturalien-Sammlung.*
Turin: *Museo Civico.*
Ueberlingen: *Steinhaus Museum.*
Varese: *Museo di Varese.*
Verona: *Museo Civico.*
Viadana: *Museo Civico.*
Vienna: *K. K. Naturhist-Hof-Museum (formerly K. K. Munz- und Antikenkabinet).*
Yverdon: *Musée de la Ville.*
Zürich: *Sammlung der antiquarischen Gesellschaft.*

PRIVATE COLLECTIONS.

Boynton, Thomas, F.S.A.Scot., Bridlington.
Castelfranco, Professor, Milan.
Evans, John, D.C.L., F.R.S., F.S.A., Hemel Hempstead.
Frank, Oberförster, Schussenried, Württemberg.
Grainger, Canon, Broughshane, Ireland.
Restaurant Lacustre (Port), Aix-les-Bains.
Le Mire, M. Jules. Collection of Relics from the Palafitte in the Lake of Clairvaux, exhibited at the International Exposition, Paris, 1889.
Ley, Herr, Bodmann, Baden.
Leiner, Herr, Constance, Baden.
Lord Talbot de Malahide, Malahide Castle.
Messikommer, Herr Jacob, Wetzikon, Switzerland.
Much, Dr., Vienna.
Quaglia, Sig. Giuseppe, Varese.
Rabut, M., Chambéry. (This collection is now in the British Museum.)
Rambotti, Dr., Desenzano, Italy.
Regazzoni, Professor. (Collection in the *Museo di Como.*)
Vouga, M. A. (Collection in the Boudry Museum.)
Vouga, M. E., Marin.

(3) Messrs. Chantre, Gross, A. and E. Vouga, R. Forrer (editor of *Antiqua*), and others, as well as a large number of the secretaries of Archæological Societies, have most cordially granted me permission to take extracts or copy such illustrations from their published works as I might think necessary. The instances in which I have availed myself of this privilege are acknowledged in the text and in the tabulated list of illustrations.

(4) The following Societies have kindly allowed me to use electrotypes of a number of their woodcuts, all of which are duly specified in the list of illustrations:—

Ayr and Galloway Archæological Association.
Society of Antiquaries of Scotland.
Anthropological Society, London.
Royal Archæological Institute of Great Britain and Ireland.
Royal Irish Academy.
Royal Historical and Archæological Association of Ireland.

(5) The bibliography was to a large extent compiled at the British Museum Library, where I found greater facilities for such work than in any similar institution on the Continent. In addition to ready access to public libraries, I have to acknowledge the receipt of a number of valuable annotations and references in special libraries attached to museums or belonging to Societies. Among the archæologists who have thus aided me I have specially to mention MM. Pigorini, Voss, and Reinach (St. Germain). The Hon. H. A. Dillon, Secretary of the Society of Antiquaries, supplied me with the reference to the capture of an Irish crannog by the English, quoted at page 482.

My learned friend Joseph Anderson, LL.D., greatly assisted me in revising the proof sheets.

For all these varied and valuable contributions to this work, as well as for the many acts of kindness and good wishes received during our peregrinations, I now express my warmest thanks and gratitude.

Edinburgh, 15th May, 1890.

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LAKE OF MORAT.

14.—VALLAMAND AND GRENG-INSEL: No. 1, Iron knife, with the tang and portion of back of bronze—2, 4, and 10, Bronze pendants—3, Fish-hook with portion of wire attached (bronze)—5, Bronze rod, with oblong perforations and curved ends—6, Ornamented bronze chisel—7, Bronze button—8, Bronze razor in wooden case—9, Portion of flint dagger, beautifully chipped—11 and 12, Bronze combs—13 to 16 and 18, Specimens of pottery—17 and 20, Objects of horn—19, Bronze dagger (Roman?)—21, Pin, with portion of chain attached—longer in the actual specimen (bronze) 72

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17.—MORGES, THONON, AND ST. PREX.—No. 1, Bit of pottery, with herring-bone pattern—2 and 3, *Armillæ sacræ* (see page 531)—4,

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Bracelet—5, Curious object—6, Fish-hook—7, Sword—8, Mould —9, Pendant—10, Anklet—11, and 16 to 18, Various forms of knives—12 to 15, Celts or axes. (All of bronze) 84

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18.—GENEVA AND TOUGUES (9, 10, 12, and 13): Nos. 1 to 4, and 10, Various forms of bronze celts—5, Bronze knife—6, Stone mould—7, Portion of bronze fibula—8, 11, and 14 to 17, Bronze pendants—9, Bronze sickle with raised knob—12 and 13, Earthenware dishes ornamented on the inner side—18 and 19, Bronze razors 91

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19.—Nos 1 to 3, Handles of three bronze swords, with the tips of the first two—4, The bronze tip of a scabbard—5, Small bronze ring 94

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LAKE OF BOURGET.

20.—Nos. 1 to 4, Socketed spear-heads—5, 12, and 15, Daggers—6, 7, 8, 13, and 14, Knives—9 to 11, and 17, Hatchets—16, Sword handle—18, Socketed hammer with side loop—19, Chisel —20 and 21, Sickles—22 and 23, Razors—24, Tweezers—25, Girdle clasp—26, Stone mould. (All bronze except No. 26) ... 100

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21.—Nos. 1 and 2, Bronze tubes with loose rings—3 to 6, and 12, Objects of unknown use—7, Spiral finger ring—8, 11, and 14, Vessels—9, Needle—10, 18, 19, 21, 30 and 31, Pins—13, 22 to 26, and 32, Various forms of arrow-points—15, Portion of clay ceiling ornamented with concentric circles—16, 17, and 29, Ornamented bracelets—20, Bronze tip of a sword sheath—27, Amber bead—28, Glass bead—33, Bronze button—34 to 37, Pottery, portions of dishes and a percolator. (All bronze, except when otherwise specified) 101

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LAKE OF ANNECY.

22.—No. 1, Bronze flat celt—2 Bronze pin—3, Copper bead—4, Bronze anklet (after Rabut)—5, 6, and 7, Flint weapons—8, and 9, Stone axes—10, Arrow-point of clay schist 103

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LAKE OF CLAIRVAUX.

23.—Nos. 1 to 4, Flint weapons—5, Horn chisel, with handle as part of the horn—6 and 8, Stone axes in horn settings or handles—7, Horn hammer-axe, with portion of the wooden handle still remaining—9, 13, and 14, Bone implements—10, A flat object of polished stone with a small perforation at one end —11 and 12, Bronze dagger and chisel—15, Wooden dish ... 106

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24.—Robenhausen: No. 1, Flint arrow-point—2, Bone arrow-point —3, Pendant of red stone—4, Copper celt—5 and 6, Small red stones, with a series of round perforations—7, Horn cup—8, Stone celt in horn casing (Museum of Mayence)—9, Nephrite chisel in horn handle (Museum, Munich)—10, Hammer stone— 11, Bronze celt—12, Horn hammer partially perforated—13, Perforated stone disc—14, Fragments of pottery (one from *Antiqua*, 1885)—15, Wooden knife—16, 17, and 18, Earthenware dishes, one resting on a clay ring—19 and 23, Stone axes with wooden handles—20 and 21, Clay weights—22, Earthenware crucible—24, Implement of wood, supposed to be hook for picking up fishing lines (Museum, Berne)—25, Roll of yarn (after Keller, B. 126)—26, Wooden club 115

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LAKE OF CONSTANCE.

27.—Wangen: Nos. 1 to 3, Flint arrow-points—4, Flax comb of bones—5 and 6, Stone axes in horn handles—7, 8, and 9, Perforated stone axes—10, Stone chisel—11 and 16, Various forms of fish-hooks of bone—12 and 13, Ornamented spindle-whorls of earthenware—14, Stone pendant—15, Flint saw in wooden handle—17 to 19, Specimens of earthenware dishes—20, Perforated stone disc 126

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31.—Nussdorf, Maurach, Lützelstetten, etc.: Nos. 1 to 5, Flint implements and weapons—6 and 7, Bone combs—8, Bone chisel 9 to 13, Pendant, needle, and daggers of Bone—14 and 15, Clay spindle-whorls—16 to 19, Copper celts (Maurach)—20, Forepart

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34.—Schussenried: Nos. 1 to 8, Flint arrow-points and scrapers—9 to 12, Stone celts—13, Broken stone polisher—14, Perforated stone hammer-axe—15 and 16, Implements of horn and bone—17, 24 and 25, Fragments of ornamented pottery—18, Earthenware spoon—19, Stone chisel in horn handle—20, Semilunar flint saw of Scandinavian type (Museum of Nat. Hist., Stuttgart)—21 to 23, Vessels of earthenware 149

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All the objects represented in Figs. 36 and 37 are in the Ethnographical Museum, Munich.

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38.—Mondsee: Nos. 1 and 6 to 12, Flint arrow-points, one (No. 10) with portion of stem attached by asphalt—2 to 4, Flint saws (Krummesser)—5 and 9, Flint scrapers—13 to 15, Stone axes—16, 27 and 28, Bone chisels, showing marks of usage—17 and 18, Perforated teeth—19, Bone ornament—20, and 24 to 26, Bone and horn implements—21 and 22, Ornaments of white marble—23, Bone arrow-point 158

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42.—Nos. 1 to 5, Flint implements and weapons—6 and 16, Well-finished hooks of horn—7, Peculiar object of bone, supposed to be a bait for catching fish—8, Ornament of horn—9, Chisel of greenstone—10, Ornamented dish of earthenware—11, Clay figurine like a hedgehog—12, Celt of nephrite—13, Horn object, perforated at the one end lengthways—14, Piece of horn ornamented with a check pattern of incised lines—15, Bone needle

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—17, Fragment of ornamented pottery with transverse perforation—18, Stone anvil with traces of copper—19, Object of pottery open at both ends—20, Base of a dish marked with a depressed cross—21, Object of pottery, conical at both ends—22, Mould of earthenware—23 and 24, Portion of a figure of earthenware resembling the human form (see Fig. 195) 173

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47*a*.—Similar machine from the Valle di Fontega, North Italy, showing the two central valves detached, and some sticks found along with it. (After Meschinelli, B. 467.) 181

47*b*.—Antique wooden implement from Ireland, showing upper and under surfaces. (From *Ulster Journ. Arch.*, vol. vii.) 183

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49.—Bodio, Cazzago, and Bardello: Nos. 1 to 7, Flint implements and weapons—8 to 11, 21 and 40, Bronze daggers—12, 22, 23, and 25 to 29, Bronze pins—13, Bronze chisel or awl—14 and 39, Fragments of pottery—15, Stone celts—16, 32, 33, 35, 36 and

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38, Various objects of stone perforated with one or more holes, probably used as buttons or beads—17 to 19, Bronze fish-hooks—20 and 44, Bronze celts—24 and 43, Socketed spear-heads of bronze—30, Stone polisher (see p. 193)—31, Stone mould—34, Spindle-whorl of earthenware—37, Fragment of a perforated stone axe—41, Ornament of thin bronze—42, Chisel of serpentine 196

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50.—TORBIERA DI CAZZAGO-BRABBIA: Nos. 1 and 2, Flint knives—3 to 6, Flint arrow-points—7 and 8, Flint spear-heads—9 to 15, bronze fibulæ (except No. 12—iron)—16, Portion of bronze fibula—17, Bronze ornament—18, Curious object made of bronze rods—19, Bronze ring—20, Copper celt—21, Bronze celt—22 to 28, Bronze pins—29, Spindle-whorl of earthenware—30, 31, and 36, Wooden floats—32, Harpoon of horn—33, Stone celt (chloromelanite)—34 and 35, Pottery 199

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THE TURBARIES OF BOSISIO, CAPRIANO, ETC.

51.—Nos. 1 to 7, Flint arrow-points—8, Flint lance-head—9 and 10, Bronze celts—11, Bronze spoon—12, Bronze knife—13, Bronze pin—14 and 18, Bronze fibulæ—15 and 16, Bronze bracelets—17, Bronze pendant—19, Spiral ring of bronze 205

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60.—Nos. 1 and 3, Bronze daggers—2, 4 to 6, 10 and 11, Bronze pins—7 and 8, Flint knives—9, Conical beads of vitreous paste—12, 13 and 14, Pottery—15, Bronze pendant (Phallic)—16, Spindle-whorl of soapstone—17, A canoe and two paddles—18, Clay weight—19 and 20, Stone celts—21, Wooden float of fishing-net—22, Spindle-whorl of terra-cotta—23, Upper and under sides of an earthenware cover of a vessel 211

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61.—Nos. 1 to 4, Flint knives—5 and 6, Flint arrow-heads—7, Pendant of steatite—8, Stone adze—9, Fragment of linen fabric 10, Stone celt—11, Wooden comb—12 to 17, Various specimens of flat spindle-whorls made of dark earthenware 214

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64.—PESCHIERA: Nos. 1 to 7, Daggers—8, and 22 to 25, Fibulæ—9, Chisel—10, Socketed lance-head—11, Knife—12 to 16, Pins—17, Object of unknown use—18 and 19, Fish-hooks—20, 21, 30 and 31, Fish-spears—26, Small cross made of tin—27 to 29, Pendants—32, Winged celt. (All bronze with the exception of No. 26.) 223

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84.—Nos. 1 to 3, Flint implements—4, Horn implements—5, 7 and 15, Objects of bone supposed to be arrow-points—6 and 17, Horn objects, supposed to be the cheek-pieces of bridle-bits—8 and 18, Horn dishes—9 and 10, Ornamented buttons of terra-cotta—11, Upper and under sides of one of these buttons—12 to 14, Bone combs, ornamented—16, Wheel-like object of bone, supposed to be the head of a pin—19, Long comb of horn—20, Bone pin—21 and 22, Handles of earthenware vessels (*anse lunate*)—23 and 24, Clay figurines—25, Object of horn—26, Bone, perforated with round holes, supposed to be a flute—27, Bronze comb—28 to 34, Bronze pins 258

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9, Bronze pins—7, Bone pin—10, 13, and 19 to 21, Bronze spears and daggers—11, Flint spear-head—12, Bronze knife, showing handle and portion of the blade—14 to 16, Flint implements—17 and 29, Spindle-whorls of earthenware—18, Stone button—22, Bronze razor-knife—23, Bronze arrow-point — 24, Iron spear-head, much corroded—25, A flat ring of wood—26, 27, 30 and 31, Fragments of pottery—28, Portion of clay weight 268

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90.—Nos. 1 to 7, Hatchets—8 to 12, and 23, Knives—13 and 14, Prongs—15 to 17, Shears—18, 27 and 28, Razors—19, 20, 21, 35, 36 and 38, Various objects of conjectural use—22, Hammer—24, 25 and 29, Hand-saws—26, Pointed implement with wide socket—30 to 32, Sickles or scythes—33 and 34, Chisels—37, File—39 and 40, Fish-hooks (bronze). All the objects are of iron except No. 40 289

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91.—Nos. 1 to 6, Iron fibulæ—7, 21, 22, 24 and 25, Glass beads—8 to 10, and 36, Bronze pins—11 to 14, Pincers of bronze and iron—15, Blunt needle—16 (gold) and 17 (iron), Halves of neck-rings—18 and 26, Bronze fibulæ—19, Bronze etui, with iron needle (20) found in it—23, Bronze button—27, 28, 30 and 32, Iron buckles and clasps—29 and 33, Iron rings—31, A small bronze axe—34, Iron bracelet—35, Iron hoop 291

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No. 1, after Bertrand (*Arch. Celt. et Gauloise*); 2, and 8 to 16, after Fourdrignier (*Sepulture Gauloise de la Gorge-Meillet*); 3, 4, 6, 17 and 18, after W. Osborne (see page 549); 5 and 7, after Vouga (B. 428).

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THE
LAKE-DWELLINGS OF EUROPE.

First Lecture.

SETTLEMENTS IN LAKE ZÜRICH, WESTERN SWITZERLAND AND FRANCE.

THE investigations of geologists in the early part of this century, culminating in the publication of Sir Charles Lyell's "Principles of Geology," not only upset current theories regarding the past history of our globe, but also revolutionised the very formulæ on which these theories were founded. The influence of this drastic clearance of antiquated machinery in geology soon extended to the collateral sciences, and one of the first to benefit from the improved methods was archæology. The first great application of scientific methods to prehistoric researches was made in the north of Europe. The Scandinavian savants, in attempting to pry into the early history of their people, found so little reliable information in their sagas and other mythological fables, that they cast them altogether aside as useless or misleading. Struck with the elegance and beauty of the stone weapons and implements so profusely scattered over the land, they seized the idea, occasionally previously mooted by writers in other countries, but hitherto never seriously considered, that there was a time when people were entirely ignorant of the use of metals, and, in the prosecution of their social industries, had to depend exclusively on such tools as could be manufactured out of stone, horn, wood, etc. To this idea they soon afterwards linked another, which experience has also shown to be founded on accurate observation, viz. that their earliest metal objects were made from a nearly uniform compound of copper and tin, known as bronze. Iron, it was maintained, was not known in the country for several centuries afterwards; but, on the other hand, when it became known, it gradually superseded bronze in the manufacture of all cutting implements and weapons, on account of its superior qualities for such purposes.

These simple observations in the hands of the Scandinavian scientists supplied the essential elements of a new system of classification, which has since become so familiar all over the world as the three ages of Stone, Bronze and Iron. Its adoption by Dr. Thomsen, in 1830, as the basis of arranging the prehistoric materials in the Museum of Northern Antiquities at Copenhagen, and, a few years later, in the Museums of Lund and Stockholm, marks the commencement of a new era in the history of prehistoric archæology. Other nations were not slow in following in the footsteps of the northern savants, and to such an extent was this new departure carried that for a time at least, all antiquarian objects were classified as belonging to one or other of the so-called ages, on the mere knowledge of their composition. So fascinating was the spell of this new doctrine, that it was some time before even experienced archæologists could see the fallacy of adhering rigidly to such a method of arranging objects; as if, the instant a bronze or an iron implement became known, the manufacture of its analogues in the inferior materials there and then ceased for ever. While, therefore, conceding that the chronological sequence of the three ages, as determined in Scandinavia, is generally correct, and holds good also for European countries, I consider it radically wrong to suppose that the respective epochs indicated by these successive stages of civilisation, especially in districts widely separated, are identical in point of time. Many local circumstances in a country, such as the poverty of the people, their isolation and distance from commercial highways, etc., have often so contributed to the persistency of customs and usages, elsewhere become obsolete and entirely superseded, that a chronological comparison of its progress in civilisation, as defined by the three ages, becomes perplexing, if not misleading, when applied to other countries. The question resolves itself, therefore, into this: that each well-defined archæological or geographical area must ascertain the chronological sequence and duration of these ages for itself.

But whatever may be the value of this system when applied to the elucidation of early European civilisation, one thing is certain—that it was the means of evoking throughout the entire world an enormous amount of interest in archæological pursuits. Henceforth primeval antiquities of every description, the merest "waifs and strays" of humanity, things which previously were utterly ignored, were now eagerly collected, described, and catalogued; and in every centre of intelligence societies and journals were founded with the express object of following up the new found trail of prehistoric man. Since then the problem of man's place in nature has come largely to the front, and now appeals for its solution to all departments of science, and to all legitimate processes of reasoning. Among those who devoted their energies to the study and elucidation of the archæological phase of this problem was the learned Ferdinand Keller, President of the Antiquarian Association at Zürich, to whom the world is indebted for one of the most remarkable archæological discoveries of this century—a discovery which in its consequential results is unique for the variety and wealth of materials with which it has illustrated that singular but long unknown and forgotten phase of prehistoric civilisation in Europe, which found its outcome in the habit of constructing dwellings in lakes, marshes, etc. This discovery of Dr. Keller was not of the nature of a lucky find, but was the result of a purely mental process —a spark of superior intelligence—fostered, I have no doubt, by his knowledge of these very Scandinavian doctrines to which I have just referred.

In countries whose lakes and rivers are fed from snow-clad mountains and glaciers, it is observed that their waters find their greatest diminution in winter, when a portion of their supply is temporarily suspended in the form of ice. This phenomenon became unusually intensified in Switzerland during the winter of 1853–4, so much so, that the level of its lakes had sunk lower than had ever before been known. Some of the inhabitants of the village of Ober-Meilen, on the east shore of Lake Zürich, took advantage of this circumstance to extend their vineyards, by recovering portions of the exposed shore, which they enclosed with stone walls, and filled in the space with mud, so as to bring its surface above the ordinary level of the lake. In the course of these operations the workmen came upon the heads of wooden piles around which were portions of stags' horns, stone hatchets and other implements (**Fig. 1**), which excited some curiosity among them. The event, however, was not singular in the district, as objects of a similar character were on several occasions encountered along the shore of the lake; and even in this same spot, in 1829, when the little harbour of the village was being deepened, bits of rotten piles, as well as implements of stone and horn, were turned up among the dredged stuff. They were not, however, deemed of sufficient value to be rescued from the mud, so that, along with it, they were carried away and redeposited in deep water. Also at Männedorf, a village a few leagues farther up the lake, during the winter of 1843–4, while its harbour was being enlarged, similar discoveries were made. A few of the relics were on this occasion collected and sent to the Museum at Zürich, where they are still to be seen. Indeed, these, and other recorded instances of antiquarian remains being fished up or dredged from the Swiss lakes, are by no means exceptional events; but, however suggestive they may now appear, they all failed to excite in the minds of their beholders that great deduction which will for ever associate the name of Keller with the lake-dwellings of Europe. On this occasion the schoolmaster of the village of Ober-Meilen, Mr. Æppli, whose house was close by, considered the find of sufficient importance to be brought under the notice of the Antiquarian Association at Zürich, which he accordingly did in the month of January, 1854. Thus it was that Dr. Keller appeared on the scene. From the investigations which subsequently ensued the following general facts were ascertained.

(*a*) *Composition of Lake-bed.*—First, or uppermost, there was a stratum of yellowish mud, from 1 to 2 feet thick, mixed with rounded pebbles, and in all respects similar to what was being deposited in the shallow indentations of the lake in the vicinity. Beneath this was a deposit of blackish mud, mixed with decayed organic matter, and varying in thickness from 2 to 2½ feet, in which the tops of the piles appeared and all the relics were found. The third stratum was in composition somewhat similar to the first, and, like it, with the exception of the deeply penetrating piles, was devoid of antiquarian remains.

(*b*) *Disposition of the Piles, etc.*—The exact dimensions of the area occupied by the piles were not determined, but it appeared to be considerable, and to stretch along the shore within a few fathoms of the ordinary water-mark. The piles were made of different kinds of wood—oak, beech, birch, and fir being the most prevalent—and they varied in thickness from 4 to 6 inches. Sometimes entire stems were used, but more frequently they were split into halves or quarters. They were about 1½ foot apart, and had a kind of systematic arrangement in rows parallel to the beach. Some piles were pulled up, and their tips were found to have been pointed by blunt tools, the cuts of which were, in the estimation of experienced carpenters who had examined them, precisely similar to those which would be made by those very stone implements collected around them.

(*c*) *Relics.*—The relics were of a mixed character, and included the following:—Stone celts and chisels, some of them being still fixed in their horn handles and fastenings (**Fig. 1,** Nos. 3, 4, 11, and 15); perforated hammer-axes (Nos. 8, 13, and 17); mealing-stones and polishers (No. 12); various implements made of flint, as scrapers, flakes (No. 1), saws (No. 2), and some rude arrow-points (only one being neatly finished, No. 16); various objects of horn and bone (Nos. 6 and 7); also some wooden clubs, fragments of pottery, spindle-whorls (No. 14), shells of hazel-nuts, etc. Among the relics then collected were a bead of amber (No. 9) and a bronze armilla (No. 10).

After careful consideration of the facts thus brought to light, Dr. Keller came to the conclusion that the piles had formerly supported a wooden platform, that on this platform huts had been erected, and that, after these had been inhabited for a long period, the whole structure had been destroyed by fire.

A knowledge of these discoveries at Ober-Meilen, and of Dr. Keller's opinion in regard to them, soon spread among the surrounding inhabitants, the immediate result of which was a sudden crop of lacustrine explorers, who carried on a vigorous search for similar remains in this and the adjacent lakes. For their guidance were requisitioned all sorts of traditions, stories of submerged cities, of which many abounded, recollections of the occasional finding of implements and weapons of unusual types, etc.; but of greatest service was the local knowledge of fishermen, who, from practical experiences of disasters to their nets and fishing gear, could at once point out numberless localities where large fields of submerged piling were to be found. In the spring of the same year the celebrated station known as the Steinberg,

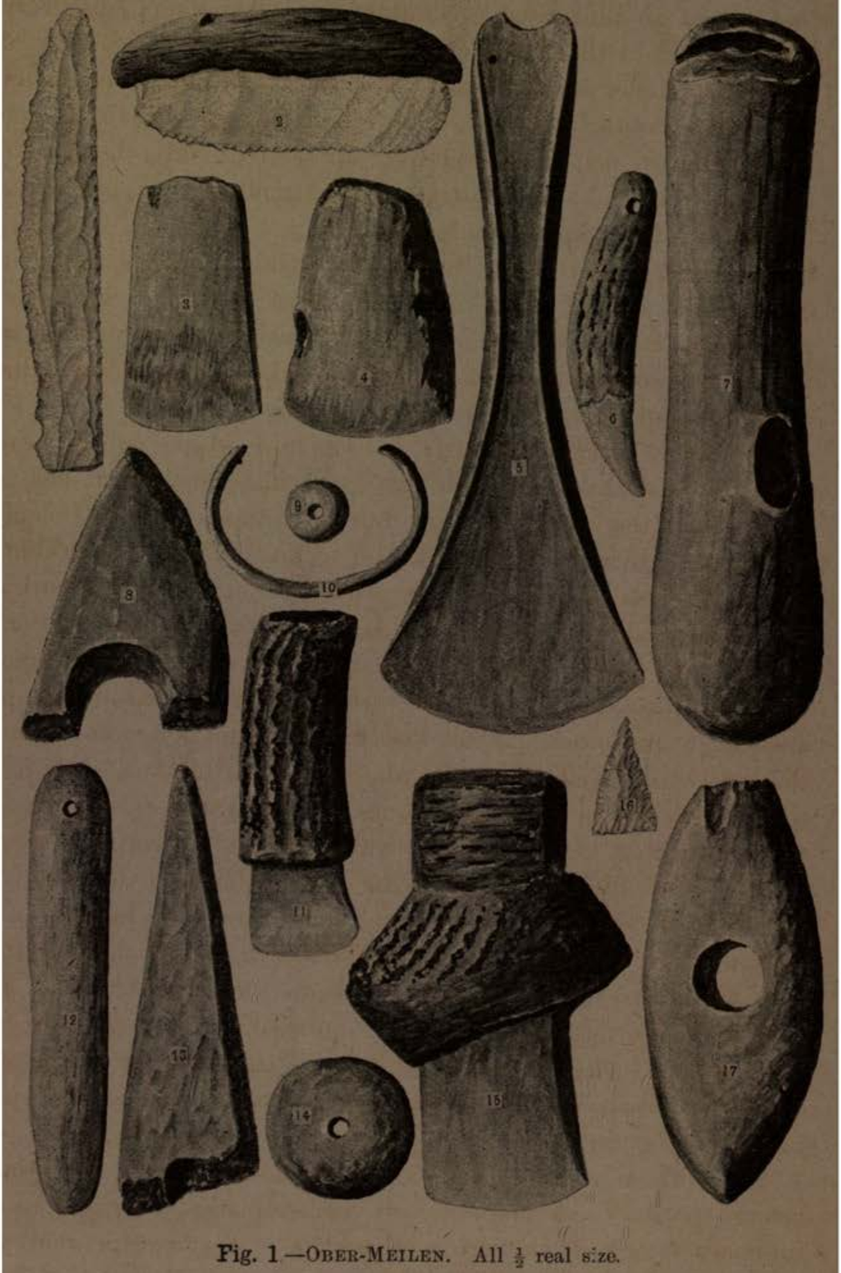
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Fig. 1.—Ober-Meilen. All ½ real size.

at Nidau, in Lake Bienne, was discovered, as well as numerous other stations in the lakes of Bienne, Neuchâtel, and Geneva; so that before an illustrated account of the Ober-Meilen discovery could appear in the Transactions of the Antiquarian Society of Zürich Dr. Keller had important materials of a similar character from other localities to record. This report, entitled "Die Keltischen Pfahlbauten in den Schweizerseen," appeared towards the close of the year 1854, and at once attracted the attention of archæologists in all countries. Since then lacustrine investigations in search of lake-dwellings have been incessantly carried on, not only in Switzerland, but in many other countries in Europe, with the result that each year has seen an increase in their number, as well as a corresponding enhancement of the archæological value of the materials so discovered.

Prominent among the early investigators whose names have a claim to be associated with this great discovery which has so popularised the name of the Zürich antiquary were Colonel Schwab, of Bienne, whose splendid collection of lake-dwelling antiquities now adorns his native town; Professor Desor, author of the admirable little treatise "Les Palafittes, ou Constructions lacustres du lac de Neuchâtel," and other works; and Professor Troyon of Lausanne, whose work, "Habitations lacustres des temps anciens et modernes," is so well known. But foremost among them all stood Keller himself, who from time to time, according to the demands of fresh discoveries, issued systematic reports of the Pfahlbauten, of which no fewer than six had appeared previous to the year 1866. In that year was published the English edition of Keller's reports, arranged and translated by Mr. Lee. It is needless to pursue here any further in historical order the various means, whether as publications or investigations, by which Keller's discovery was being pursued, as they come to be dealt with elsewhere. Suffice it to say that within a few years of its publicity, the existence of lacustrine villages all over Central Europe in prehistoric times was fully established.

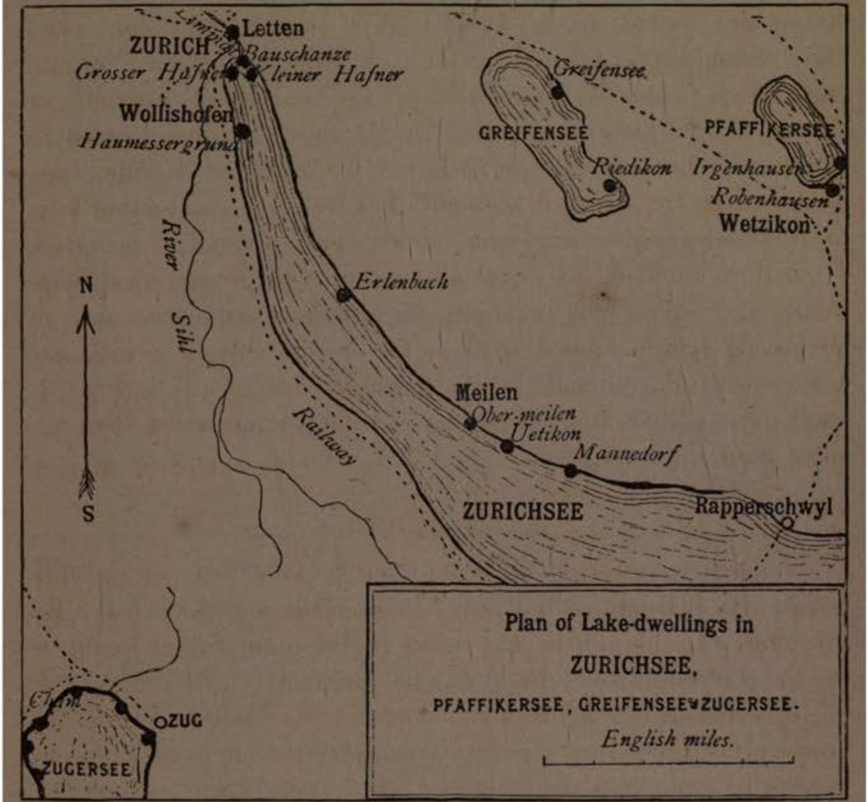
From these remarks you will have some idea of the work before us in these lectures. It contemplates a critical and summary review of the principal results of the investigations of the lake-dwellings of Europe during the last half-century. This embraces a large geographical area, extending, roughly, from Ireland to Bulgaria, and from Venice on the Adriatic to the shores of the Baltic. Of the very numerous researches to which I shall have to refer, some were conducted by private individuals, others by public or scientific bodies, but all presumably more or less qualified to give a correct report of the facts. The records of successive discoveries have been generally published in the proceedings of local societies, but sometimes in separate monographs of extremely limited circulation. As to the antiquities, some have found their way to dealers, and have disappeared to foreign lands. A large proportion, however, have been carefully preserved in the respective districts or countries in which they were found, and are now located in public museums or private collections, where, as a rule, they are intelligently arranged and duly labelled. In conducting you, as it were, over this wide area, amidst such diversified materials, I shall be guided, to a certain extent, by geographical convenience, even at the expense of historical sequence; and in discussing typical finds I shall, as far as this may be practicable, make use of diagrammatic and pictorial illustrations, believing that even a poor illustration often conveys more information than the most accurate description.

LAKE ZÜRICH.

Further discoveries in Lake Zürich were not so speedily effected as in some of the other Swiss lakes, and for a few years the interest in this subject was transferred to more distant localities. In the following year, 1855, Colonel Schwab visited Zürich and made further researches at Männedorf and Ober-Meilen. From the latter he succeeded in securing a considerable number of objects, especially stone hatchets, some of which were made of nephrite, and a bronze celt of the flat type (**Fig. 1**, No. 5).

In 1858, in the course of some dredging operations for the purpose of deepening the mouth of the Limmat, fragments of pottery, bits of piles, and some peculiar beams having one or two square-cut holes (**Fig. 2**, Nos. 13 and 14) were dredged up. Dr. Keller recognised here the site of a Pfahlbau which extended both under the little island called Bauschanze and outwards towards the lake. (B. 22 and 336.)

Two other localities near the outlet known as the "Kleiner Hafner" and "Grosser Hafner" were also proved to have been stations. The former was opposite the north end of the Tonhalle, and about 150 yards distant from the original shore. It occupied a circular area of about 1½ acre in extent and, when the water was low, its surface was only some 3 feet submerged. The Grosser Hafner was farther off in the lake, and its area was considerably larger than that of the Kleiner Hafner. On a clear day in both these localities stones and the tops of piles could be seen. Another locality known to Dr. Keller at this early period was about two miles from Zürich, on the west shore of the lake and just opposite the steamboat pier at Wollishofen. Here the lake-bed consisted of a deposit of fine mud, and owing to the constant commotion made by the steamers in passing to and fro the *débris* of the lake-dwelling had been greatly covered up. (B. 336.)


Letten
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Bauschanze
Grosser Hafner
Kleiner Hafner
Wollishofen
Haumessergrund
River Sihl
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Erlenbach
Railway
Meilen
Ober-meilen
Uetikon
Mannedorf
ZURICHSEE
Rapperschwyl
Greifensee
GREIFENSEE
Riedikon
PFAFFIKERSEE
Irgenhausen
Robenhausen
Wetzikon
Cham
ZUG
ZUGERSEE

Plan of Lake-dwellings in ZURICHSEE, PFAFFIKERSEE, GREIFENSEE & ZUGERSEE. English miles.

As the Kleiner Hafner lay directly along the course followed by the steamers, and greatly obstructed their passage, the authorities, in 1867, resolved to have the obstruction removed altogether. For this purpose a dredging machine was used, by means of which a segment several feet thick was removed from its surface. During this operation the same kind of perforated beams which had already attracted attention at the Bauschanze were turned up among the stuff, together with numerous objects of flint, stone, bone, etc., similar to those at Ober-Meilen (**Fig. 2,** Nos. 9 to 17). In addition to these, however, there were bronze axes of the winged type, some spoon-shaped crucibles, large clay rings and fragments of pottery of an unusually fine kind (**Fig. 2,** Nos. 1 to 8). But, what was considered still more strange, there were among these relics some iron weapons and Roman tiles.

Hitherto there was little or nothing done to the Grosser Hafner, and the "Haumessergrund" at Wollishofen, and so the surmises of Dr. Keller regarding them might have died with him, had it not been for the extraordinary exertions of the people of Zürich to have their beautiful environments made still more attractive by art. These extensive alterations, begun some six years ago, and scarcely yet completed, have so entirely changed the aspect of the shore in the immediate neighbourhood of the outlet, that visitors whose recollection of the town dates farther back than these transformations, will hardly recognise the locality. A splendid bridge now spans the opening of the Limmat, and on both sides of it are elegant promenades, gardens, and ornamental quays, which occupy what was formerly part of the lake. The filling up of such a great area of lake-bottom involved the use of dredgers, which, with revolving buckets, raised stuff from the most convenient shallows along the shore, and having dropped it into boats, it was then transported to its final destination. Among the localities selected for these operations were the Grosser Hafner and the outskirts of the Bauschanze. The rich loamy deposits of the Haumessergrund at Wollishofen were also found suitable for mixing with the gravel and for forming a good soil for the floral and horticultural gardens which now form such a conspicuous ornament to the fashionable walks along the northern shore of the lake.

The Grosser Hafner * supplied a wonderful medley of antiquarian objects, apparently of all ages—stone hatchets (one of which was 10 inches long), horn handles, bone implements, etc. Among bronze objects were: hatchets of the winged type, chisels,

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* *Corr.-Blatt*, p. 14, 1884. *Antiqua*, 1883, i. pp. 31, 53; and ii. pp. 47, 54. B. 336 and 462.

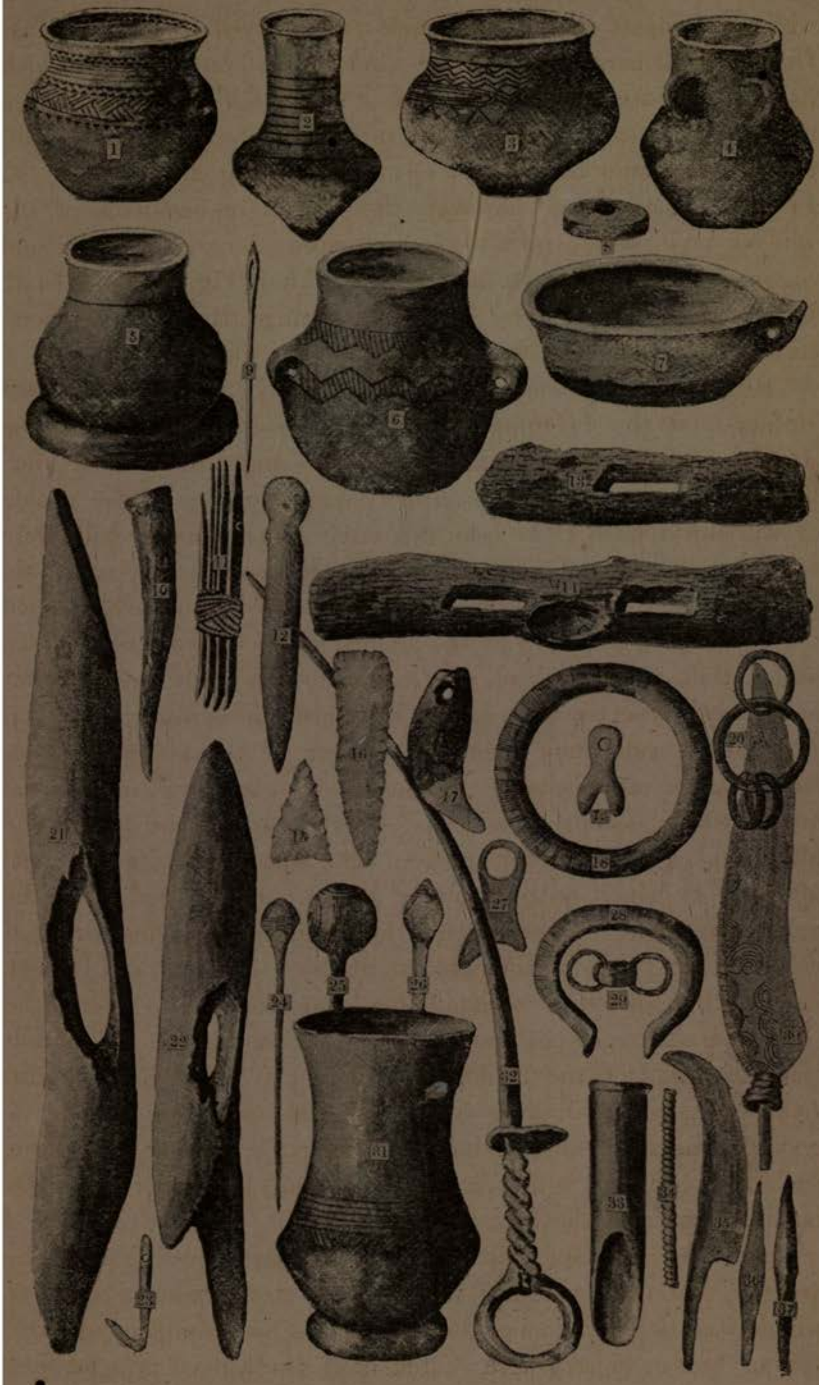
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Fig. 2.—BAUSCHANZE (13, 14, and 21 to 23); KLEINER HAFNER (1 to 12, and 15 to 17), and GROSSER HAFNER. All ⅓ real size except 13 and 14.

sickles, knives (some ornamented with half-circles, points, and lines, (**Fig. 2,** Nos. 30 and 35); pins with large heads, oval or round, and sometimes perforated and variously ornamented (Nos. 24, 25, and 26); arm-rings, both closed and open, and ornamented with engraved lines, dots, etc. (Nos. 18 and 28); a few spirals (No. 34), small rings and pendants (Nos. 19 and 27); two solid rings attached by a band (No. 29); a group of four rings—one being larger, on which the other three were hung (No. 20); a pin-like object, 15½ inches long, with a handle like that of a sword (No. 32); lance-heads, some of which were ornamented; a few small beads of amber. Among the fragments of pottery were two vessels complete with round bases (No. 31), and part of a moon-shaped crescent, rudely ornamented with depressions like finger-marks.

Here, again, as in the Kleiner Hafner, objects apparently of a later date were found, among which were Roman tiles, pottery of the kind known as *terra sigillata,* and an iron spear-head; also upwards of 16 coins of the time of Augustus, Tiberias and Vespasian.

On the other hand, at the Bauschanze, while objects of the stone age were very numerous, there were scarcely any of bronze. Most of the objects collected on this station were dispersed; but among the few that have come to the knowledge of antiquaries are some remarkable implements of horn, like picks, said to be field-hoes (Nos. 21 and 22). One of these is 14½ inches long, pointed at one end and chisel-shaped at the other. Another (10½ inches long) is also pointed at one end, but forked at the other. Both are perforated with an oval hole for the insertion of a wooden handle.*

WOLLISHOFEN.—The greatest of all the finds in Lake Zürich was that at Wollishofen. (B. 448, 449a, and 462.) Here, again, the dredging machines brought up a large quantity of wood, among which were some of those peculiar oak beams with square-cut holes, already noticed (**Fig. 2,** Nos. 13 and 14). The wood was of various kinds, and so abundant that the poorer people were in the habit of collecting it for firewood. Although the antiquities of the stone age were numerous, the great feature of this station is that it belonged to, or at least existed during, the most flourishing period of the bronze age. Notwithstanding pilfering, and the difficulty of detecting the smaller objects, the collection, as now deposited in the Museum at Zürich, must be considered one of the most important in the whole series of lake-dwelling researches. Among the more remarkable objects were the following:—

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* *Antiqua,* 1883, p. 61.

Weapons.—Four bronze swords, one only of which is complete (**Fig. 3,** No. 1); its entire length is 28½ inches, including the handle, which is also of bronze (barely 4 inches long), and to which the blade is attached by two rivets; another (No. 2), which is defective both in the blade and handle, is of a different type, especially in the formation of the handle, which was intended to have bone or wooden plates fastened with rivets to the remaining bronze portion; it is ornamented with a combination of circles or semicircles, in incised lines or dots. Three daggers, two of which have rivet-holes, and the third has what appears to be the remains of a tang. Eleven arrow-heads of bronze, and several of flint and bone. Of the former, two only have sockets (Nos. 4 and 14), the others being imitations of the ordinary flint forms (Nos. 3 and 5). Lance-heads were in much larger numbers than either the swords or daggers; they are mostly socketed, with side rivet-holes for fixing the handle; they vary in length from 3½ to 8 inches, and are sometimes ornamented, as shown in No. 7, and only two had tangs. Portions of wood are supposed to be fragments of bows.

Industrial Implements and Ornaments.—The stone hatchets are exceedingly well-made, and appear to have been partly sawn from water-worn boulders of serpentine and hornstone. None were of *nephrite* or *jadeite;* a few of horn have been noted (**Fig. 185,** No. 15). The bronze hatchets (**Fig. 4,** Nos. 16, 20, and 25) were numerous, the greatest number having four wings and sometimes a loop at the side; the direction of the cutting edge is generally at right angles to that of the wings, but in a few instances parallel to it (as in No. 16); at the top of the hatchet there is a hole or small recess. Of the flat kind there were a few, one of which is here figured (No. 25). Two small ones are of copper (**Fig. 3,** No. 17). The knives are mostly ornamented with running patterns or circles or semicircles in dots or lines, and the blades are all more or less curved (**Fig. 4,** Nos. 11 to 15); the handles were sometimes solid and of a piece with the blade, but more frequently they were of horn or wood, and attached by tangs or rivets. It is rather remarkable that amongst the large

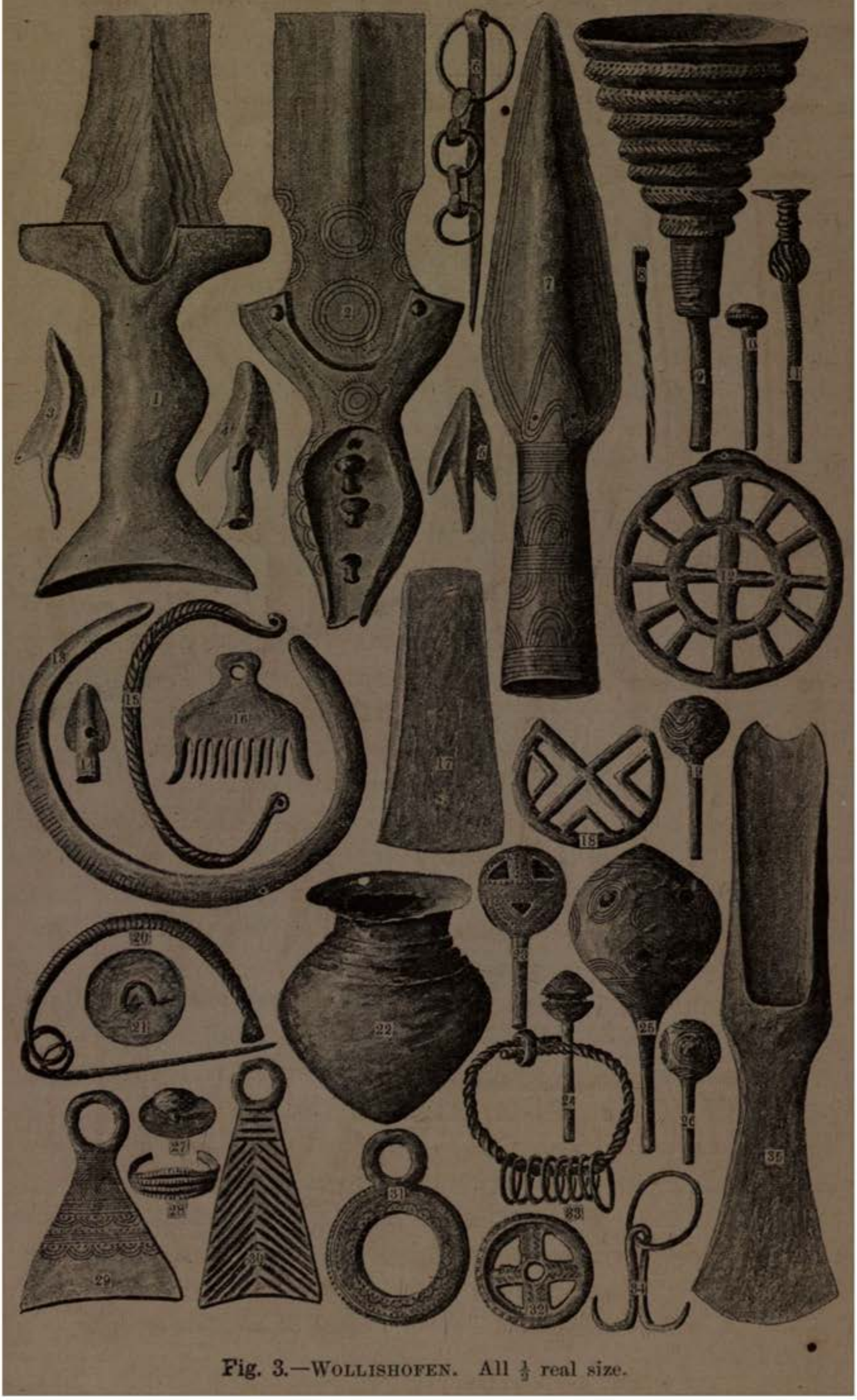
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Fig. 3.—Wollishofen. All ½ real size.

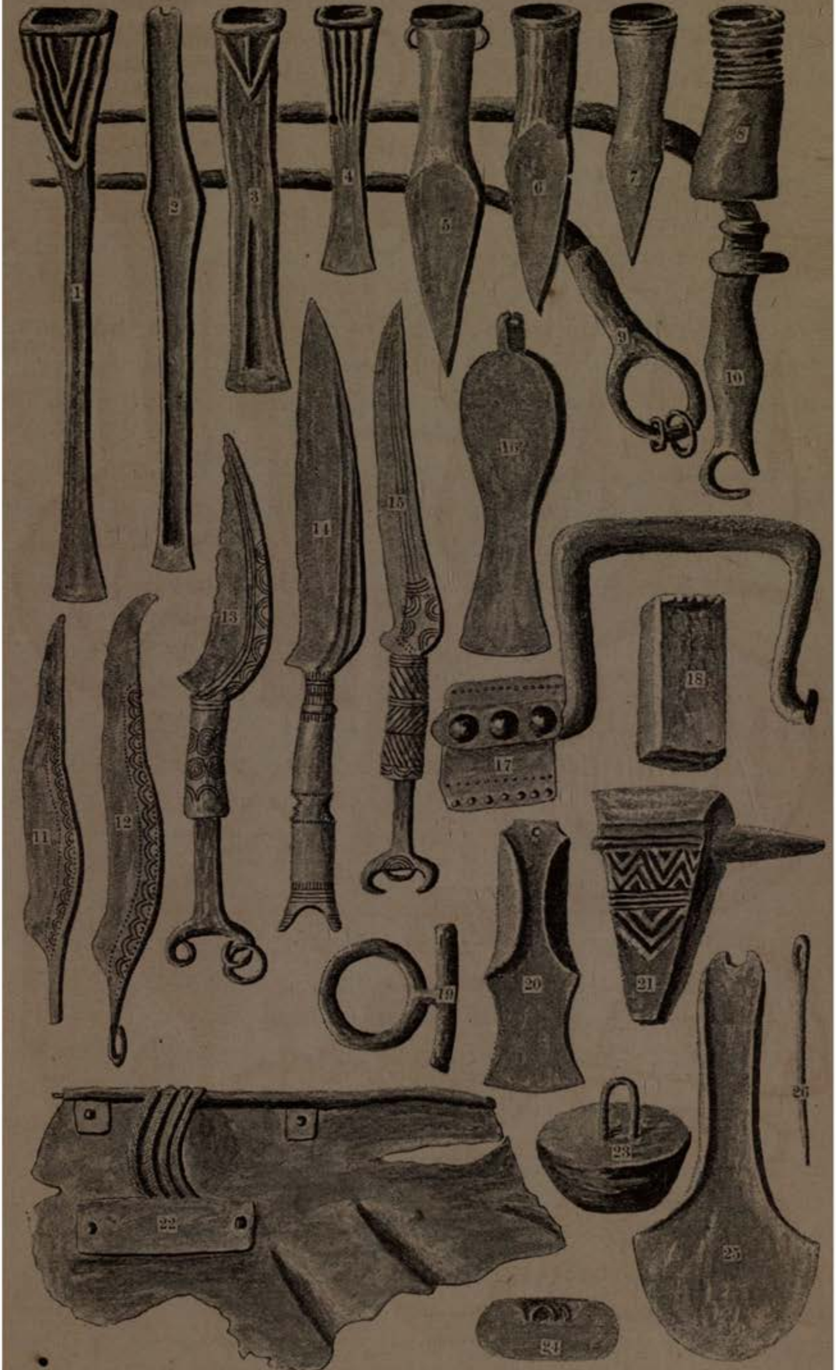
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Fig. 4.—Wollishofen. All ⅓ real size.

number of knives collected at Wollishofen there is not one of the socketed kind, which, as we shall afterwards see, are so frequently met with in Lake Bourget and some stations in western Switzerland. Some sickles of the usual type, fish-hooks, and a few of the socketed razor knives. Of bronze hammers there are six, all of which are socketed and either round or rectangular in shape (**Fig. 4**, Nos. 8 and 18). The round one, No. 8, is ornamented with a series of circular grooves, and has a socket 1¾ inches deep; it weighs 490 grs.

There is a considerable number of chisels and gouges (**Fig. 4**, Nos. 1 to 7), small tubes, broad-headed nails and studs. One bronze punch is bifurcated (*Antiqua*, 1886, Pl. v. Fig. 8). An elegant vase of solid bronze (**Fig. 3**, No. 22), and fragments of large situlæ, made of thin bronze plates riveted (**Fig. 4**, Nos. 17 and 22). One of the most remarkable objects is that represented on **Fig. 4**, No. 21, which is supposed to be an anvil. Several long pins with sword-like handles, similar to one found on the Grosser Hafner (**Fig. 4**, Nos. 9 and 10). Bronze hair-pins were so numerous that they are to be counted by hundreds in the Museum (**Fig. 3**, Nos. 6, 8, 9, 10, 11, 19 and 23 to 26). One bronze comb and one bronze fibula (**Fig. 3**, Nos. 16 and 20). Bracelets are well represented, both closed and open; they are either flat or in solid mass (**Fig. 3**, No. 13), and generally ornamented; one (No. 15), open at the ends, is made of two stout wires, one of which is spirally grooved, and the other plain; these wires are united at the ends by a tin pin, which passes through a loop formed by the recoil of the ends of the wires. A large hollow ring (three inches internal, and rather more than four inches external diameter) is highly ornamented. (See **Fig. 188**, No. 2.) Finger-rings (**Fig. 3**, No. 28), pendants (Nos. 29, 30, and 31), buttons (No. 21), studs (No. 27), a so-called *portemonnaie*, for ring money (No. 33), portions of girdles (**Fig. 4**, No. 19). There are also one ringlet of gold and three beads, one of amber and two of glass. Amongst the nondescript objects are several small wheels—three of pottery (**Fig. 5**, No. 6), five of bronze (**Fig. 3**, Nos. 12 and 18), and two of tin (No. 32)—a leaden weight, which has a high loop of bronze (**Fig. 4**, No. 23). An object of the same kind (No. 24), with two loops, was found at Onnens. Besides the two copper celts (**Fig. 3**, No. 17) there were two small copper awls and several bits of this metal.

Pottery.—The pottery at Wollishofen shows vessels made of two kinds of paste, one fine, and the other coarse containing a mixture of rough sand. The vessels varied much in size, the smallest being only about one inch in diameter, and the larger ones, judging from the curve of the fragments, ranged from sixteen to twenty-seven inches in diameter. They had no glaze,

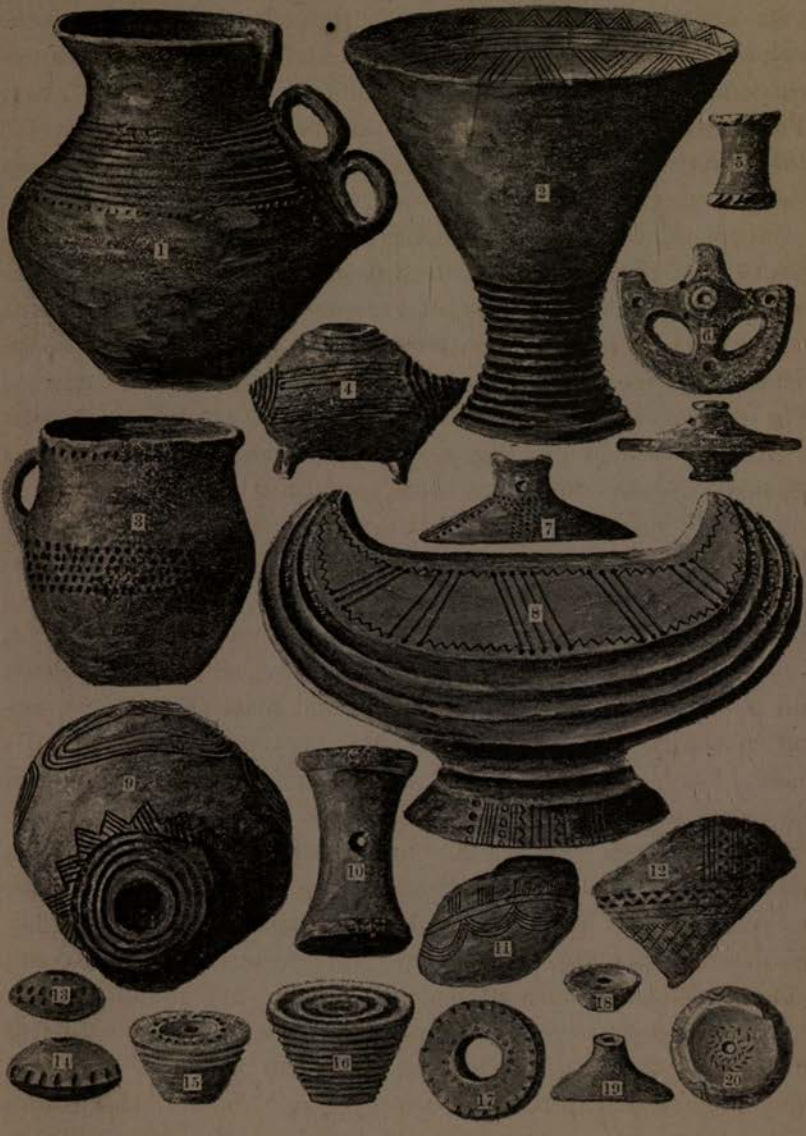


Fig. 5.—Wollishofen. All $\frac{1}{3}$ real size.

nor can it be said that the wheel was used in their manufacture, although some are very symmetrically shaped. No quartz or sand was mixed with the fine paste, of which the more ornamental vessels were made (**Fig. 5**, Nos. 1, 2, 3, 7, 9, 11, and 12). Some had a conical-shaped base, and could only be made to sit in soft material, such as sand, or by means of a ring, like those figured from the Kleiner and Grosser Hafner. One small vessel was trilocular, having its three chambers or bowls attached to one common base. Some very flat vessels were found, which are supposed to have been lids (**Fig. 5**, No. 7). Spindle whorls of burnt clay variously ornamented (**Fig. 5**, Nos. 13 to 20), and some other objects like modern thread pirns (Nos. 5 and 10) are in abundance. Portions of six crescents are all differently ornamented. Some now in the Museum have been restored, so as to show their original form and ornamentation, and it is from one of these that the illustration here given was taken (**Fig. 5**, No. 8). Some dishes took the forms of animals, as in No. 4, and were probably used as lamps.

Among other objects may be mentioned some bits of red stone, supposed to have been used as paint; foundry materials, as moulds and bronze dross; portion of a dug-out canoe; various bits of sawn and cut horn; etc.

Human Remains.—The only portion of a human skeleton was a skull, which, according to Dr. Kollmann, is of the mesocephalic type. (B. 420, p. 90.)

Organic Remains.—Wheat, millet, hazel-nuts, and crab-apples, were identified.

MÄNNEDORF.—I have already incidentally referred to the discovery of the site of a lake-dwelling at Männedorf before 1854, when such antiquities were not understood (page 4). In 1866, however, a portion of lake-bottom close to where these early discoveries were made, measuring about eighty feet by thirty, was deepened to facilitate the passage of steamers, when further evidence as to the nature of this settlement was disclosed. The piles were so closely set that there was hardly the breadth of a pile between them. The objects collected were very similar to those already described from Ober-Meilen, among which was a spoon-like crucible like those from Robenhausen. (B. 126, p. 263.) The discovery of a second station near the mouth of the Surenbach, between Männedorf and Uetikon, was noticed by Dr. Keller in his second report. (B. 22, p. 121.)

UETIKON.—Remains of another station are to be found close by the landing stage at Uetikon, from which on several occasions antiquities of the Stone Age were picked up. More decided indications of the character of this settlement were, however, revealed in 1886, in consequence of some dredging operations that were carried on. On this occasion were found not only piles, bones of various animals, as stag, ox, and pig, fragments of pottery, stone hatchets, and flint implements—the usual relics of the Stone Age—but also a few bronze rings and hair-pins. (B. 462, p. 17.)

In the Zürich Museum may be seen a considerable number of the relics from this station, among which are twenty-three stone celts (one being still in its horn fastening), five flint saws or scrapers, four pointers of horn, and a semi-globular spindle-whorl.

ERLENBACH.—Near Erlenbach were two settlements, one at Winkel, a few minutes' walk above the village; and the other at Wyden, about an equal distance below it. In 1886 the usual indications of the Pfahlbau settlements, such as piles and various industrial relics, were found in the course of some dredging operations, but the objects were mostly dispersed. (B. 462, and 420a, p. 73.)

LETTEN.—In 1877, while digging a canal in connection with the Zürich waterworks, some remarkable antiquities of bronze and iron were dug up, which Dr. Keller describes in the eighth report of the lake-dwellings. They were found in a portion of the cutting extending some eight hundred yards in length at a place called Letten, on the right bank of the Limmat, nearly opposite to where the Zihl joins it. The objects lay in a fine mud deposited by the river, and underneath a bed of gravel of the same origin. Dr. Keller came to the conclusion that the "Lettenfunde" belonged to a settlement analogous to, and probably contemporary with, the later Pfahlbauten, with the relics from which they in many respects agree. A careful inspection of the Letten relics—which include two swords, one or two spear-heads, a variety of winged celts, a couple of sickles with raised buttons, knives, a great number of hair-pins of diversified forms, an involved ring-ornament, etc., all of bronze—shows that they are of a more recent period than the lake-dwellings. Among the bronze celts are forms (as for example that in **Fig. 3,** No. 35) which have never been found in the true relic bed of a lake-dwelling; and besides there are other objects, such as a fibula, and a piece of iron partly fashioned, probably intended for a sword, which are characteristic of the La Tène period. (See **Fig. 87,** No. 6.) While deepening the bed of the Limmat similar objects, as well as those of preceding and succeeding ages (Roman), have been frequently found. The Letten objects correspond more with the pre-Roman antiquities found in the Nidau-Büren Canal and in some of the later tumuli, and may therefore be said to link together the products of two very different civilisations, viz. the bronze age of the lake-dwellings, and the subsequent iron age, so characteristic in La Tène.

For the relative positions of these stations see Sketch Map, page 9.

LAKE OF BIENNE.

INVESTIGATIONS IN THE JURA LAKES, AND ARCHÆOLOGICAL RESULT OF THE "CORRECTION DES EAUX DU JURA."—At a short distance from the eastern shore of Lake Bienne, near where the Zihl by several mouths found its former exit, there exists, or rather formerly existed, a stony elevation, covering an area of some three acres, which rose gradually from a depth of about 20 feet to within 7 or 8 of the surface. This curious cairn-like structure, being in marked contrast with the surrounding lake sediments which here consist chiefly of fine mud, was well-known to the fishermen as the "Steinberg," *i.e.* stone hillock. Among these stones were many projecting heads of piles which, to prevent injury to their nets, the fishermen were in the habit from time to time of pulling out. Moreover, at various times, on or near this steinberg, Roman tiles and some fantastically shaped objects covered with chalky concretions were picked up, which fostered a vague opinion that it was the foundation of a Roman fortress or lighthouse.

In 1854 Colonel Schwab and Mr. Müller of Nidau made a careful investigation of the steinberg, the result of which was to leave no doubt that it was the site of a lake-village which had been erected over the piles, the stumps of which then only were detected among the stones. These stones were of a pretty uniform size, not too large to be transported readily by human hands, and in material they were exactly similar to those scattered among the glacial *débris* on the neighbouring slopes. Interspersed in this cairn were, not only the upright piles of round or split stems, singly and in groups, but also transverse beams, which had evidently not fallen at random but had been intentionally placed and jammed between the uprights to keep them more firmly in position. The strange-looking objects turned out to be bronze implements encrusted with such a coating of lime that their metallic nature had been effectually concealed. The station quickly proved to be exceedingly rich in antiquities of new and varied forms. Not only the usual objects of the Stone Age, but even implements of iron and fragments of pottery of unusual elegance were fished up.

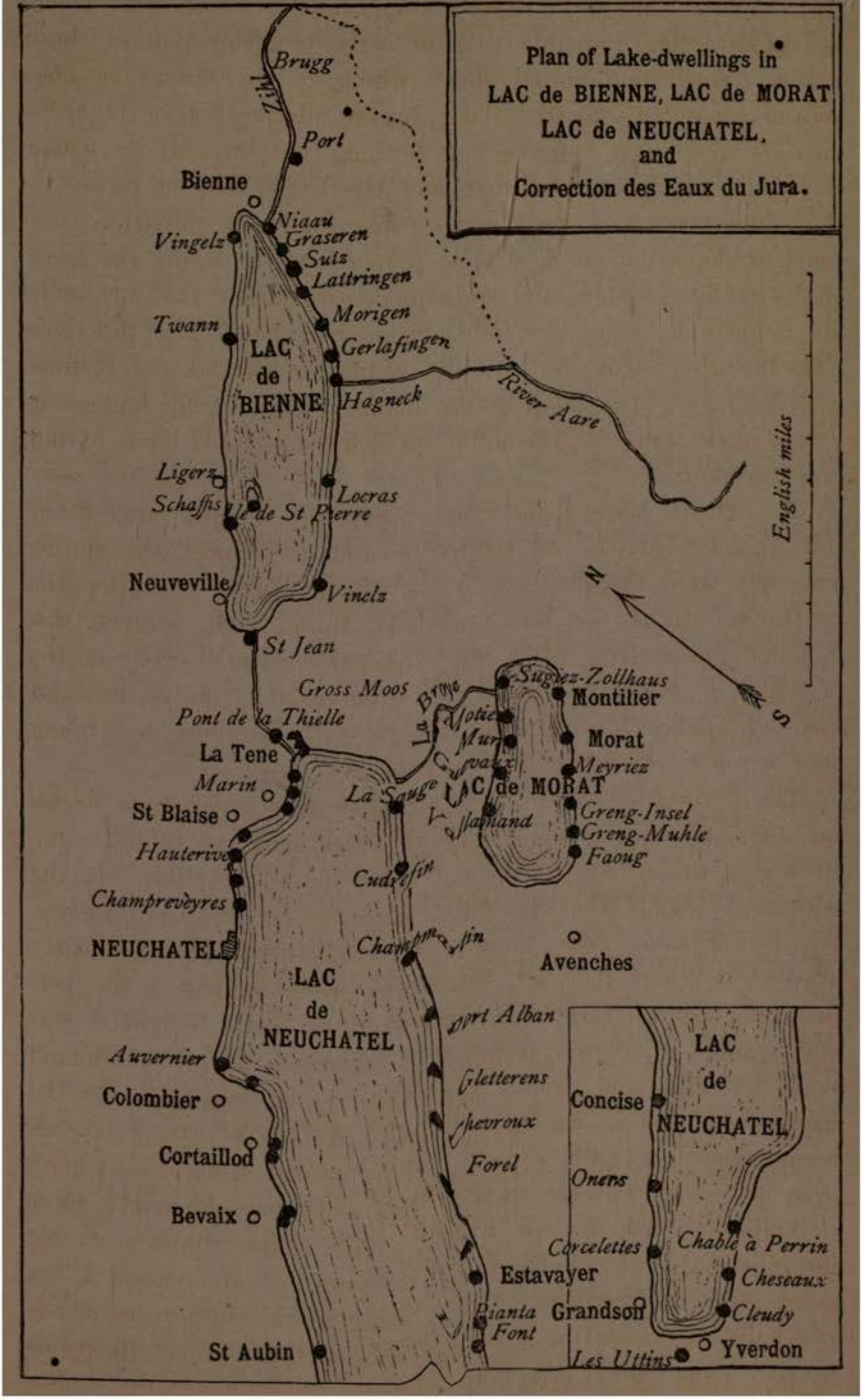
This discovery was greatly talked of in the district, and led to such a lively search for the sites of lacustrine abodes that before the end of the year some half-dozen stations were identified in the Lake of Bienne alone, not to mention a much larger number in the adjacent lakes. Notwithstanding the difficulties under which these lacustrine investigations were conducted, as dredging or digging under several feet of water was both laborious and expensive, the number of objects collected by the Swiss antiquaries in those early years is astonishingly great, as evidence of which I have only to point to the collections of Col. Schwab and Professor Desor.

It is often the case that antiquarian remains owe their discovery to the mere accident of agricultural operations, peat-cutting, drainage, etc. Such operations are, however, usually confined to small lakes and bogs. The idea of partially lowering the surface of the extensive sheets of water in the Jura valley, comprising the lakes of Bienne, Neuchâtel, and Morat, was too chimerical to be ever entertained in the interests of archæology. But what was inconceivable and utterly beyond hope from this point of view, became, in the interests of agriculture, not only a practical problem, but is now an accomplished fact. Between the lakes of Bienne, Neuchâtel, and Morat, there stretches a vast mossy district known as the "Gross Moos," through which the combined surplus water of the two latter lakes finds its way to the former. From the north end of Lake Bienne the surplus water again emerges, and is conveyed by the Zihl or Lower Thielle in a sluggish channel for some miles farther down the valley, where, before the Correction des Eaux du Jura, it united with the

Aar. As the surface of these lakes is nearly on the same level, it is more than probable that in early prehistoric times their waters formed one united sheet, which in the course of ages became separated into three lakes by the interposition of the sedimentary and peaty deposits now forming the Gross Moos. Their connecting channels, the Broye and the Upper Thielle, owing to the sluggishness of the flow, became gradually raised by the constant deposition of mud, thus proportionately raising the level of the confined waters, and consequently rendering the surrounding lands more and more liable to submergence. Also, the river Aar, though passing quite in the vicinity of the lake of Bienne, went a long way beyond it before joining with the Zihl, and often caused great havoc by flooding the richly-cultivated lands of the lower grounds.

To remedy these defects the Swiss Government entered on the gigantic project of rectifying and deepening the entire waterway from the junction of the Lower Thielle with the Aar to the mouth of the Broye in Lake Morat. The scheme also included the cutting of a new channel for the Aar, by means of which it would be entirely diverted from its old course, and made to debouch into Lake Bienne by a straight and much shorter route. (See Sketch Map, page 23.)

The hydrographical result of these works (which were begun in 1868, and only completed a few years ago) was to lower the surface of these lakes to the extent of six or eight feet. In the winter of 1871-2 the operations began to tell on Lake Bienne, but it was some years later before the others became sensibly affected. When, however, the works were completed, the permanent effect on these lakes, especially on Lake Neuchâtel, was very marked—harbours, jetties, and extensive tracts of shore-land being left high and dry by the subsiding waters. This was the harvest-time of archæology. Many of the lacustrine abodes became dry land, and were visited by crowds of eager searchers; even fishermen forsook their normal avocations, finding it more profitable to fish for pre-historic relics. Government at last interfered with this indiscriminate "howking," and passed a law restricting the privilege of excavating to the authorities of the respective Cantons on whose territories the stations happened to be. Thus the "Correction des Eaux du Jura," as the undertaking was called, greatly facilitated the investigations of the



Plan of Lake-dwellings in
LAC de BIENNE, LAC de MORAT
LAC de NEUCHATEL,
and
Correction des Eaux du Jura.

Brugg
Zihl
Port
Bienne
Niaau
Graseren
Vingelz
Suiz
Lattringen
Morigen
Twann
Gerlafingen
LAC de BIENNE
Hagneck
River Aare
Ligerz
Schaffis
Locras
Ile de St Pierre
Neuveville
Vinelz
St Jean
English miles
N
S
Gross Moos
Sugiez-Zollhaus
Montilier
Pont de la Thielle
La Broye
Motier
Mur
Morat
La Tene
Guevaux
Meyriez
Marin
La Sauge
LAC de MORAT
St Blaise
Vallamand
Greng-Insel
Greng-Muhle
Hauterive
Faoug
Cudrefin
Champreveyres
NEUCHATEL
Champmartin
Avenches
LAC de NEUCHATEL
Port Alban
Auvernier
Gletterens
Colombier
Chevroux
Cortaillod
Forel
Bevaix
Estavayer
Pianta
Font
St Aubin
LAC de NEUCHATEL
Concise
Onens
Corcelettes
Chable à Perrin
Cheseaux
Grandson
Cleudy
Les Uttins
Yverdon

Swiss lake-dwellings, and contributed enormously to the elucidation of the culture and civilisation of their inhabitants.

In the following descriptive notes of the stations in Lake Bienne I follow simply the order of their distribution along its shore, making, as it were, a circular tour of the lake, beginning at Nidau, and passing along its southern shore, then round to the other side, until we come back to our starting-point.

NIDAU-STEINBERG.—This station was so thoroughly investigated by Colonel Schwab and his assistants that little remained to be done after the lowering of the water. The objects collected are both numerous and varied, and being among the earlier of the kind brought to light from the lake-dwellings, they have been fully illustrated by Dr. Keller. (B. 15 and 22.) Among them were some heavy stone weights, some perforated, and some with an iron hoop; discoidal stones, with a marginal groove; a variety of corn crushers, polishers, and hammer-stones, etc.

Bronze.—Sickles and axes, both socketed and winged, generally with a side loop, but without a notch at the top. Knives were numerous, and some were ornamented with flowing lines and semicircles; they were hafted by tangs or sockets, but in a few instances the blade and handle were cast in one piece. Several spear-heads, one of which is richly ornamented with a series of rings and a serpentine pattern; a few arrow-points with barbs; several socketed chisels of various sizes; numerous needles, hair-pins, fish-hooks, curiously-shaped pendants, rings, and bifurcated pincer-like objects; one hexagonal-shaped hammer with a socket, and another having a small loop attached to the side like that of a celt. Some remarkably fine bracelets, open at the ends, and hollow, and having the outside ornamented with concentric circles, lines, etc.; others are solid, or made of spirally-grooved wire. A number of so-called razors, buttons, studs, broad-headed nails, spirals, the central portion of a horse-bit, etc.

Gold.—A small spiral of gold wire, and a square piece of thin plate neatly corrugated.

Iron.—A few conical javelins with sockets.

Pottery.—The potter's art seems to have been carried to great perfection. The vessels were of all sizes, from two to three feet in diameter down to the most tiny objects. They were generally round at the base, and required ring supports, of which many were found. Some shallow plates were ornamented with squares, oblongs, and circles. Various forms of spindle-whorls, some of which are made of fine paste, and blackened with charcoal, like the finest pottery. Over twenty clay crescents, represented by fragments, and one of stone. Some clay cylinders, weights, and a few rude figures of a four-footed animal.

Bone, Wood, etc.—A few bone implements, pointers, etc.; the side piece of a bridle-bit of staghorn, perforated with three holes; portion of a yoke, clubs, etc.; bits of clay with marks of wattle-work.

GRASEREN.—A small station concealed in rushes, and containing large piles. The antiquities consist of a few iron objects, one being a dagger with the handle ornamented with silver wire, and a few mealing-stones and rubbers, etc. (B. 22.)

SUTZ.—This was a very large settlement, the piles extending over an area of about 6 acres. It was connected with the shore by a bridge or gangway, about 100 yards long and 13 wide. Within its area several steinbergs were interspersed; and the relic-bed, from 4 to 16 inches thick, was near the surface. The piles were mostly of oak, and irregularly placed. The antiquities are classified as belonging to both the Stone Age and the Bronze Age, among which the following are the more interesting (B. 15 and 286):—

Stone.—Hatchets of the usual form (a few of nephrite) and others perforated; beads or spindle-whorls, one of quartz; flint arrow-heads, flakes, and knives.

Horn.—Among the horn objects were fixers for axe-heads, many with a V-shaped split at the end, probably for being better fixed in the wooden handle; perforated portions of stag-horns, in the form of hammers and clubs, three of which, in the Museum at Bern, are remarkable for their irregular forms.

Amber.—Two or three well-made beads.

Bronze.—A sword (**Fig. 186**, No. 9), a fibula, a winged celt with burnt portion of the wooden handle still remaining between the flanges, a few hair-pins, and a hook shaped like a Roman key.

Iron.—Two lance-heads like those from Nidau, and a curious trident-like object. (B. 31, Pl. xv. 10.)

Wood.—A bow of yew, quite perfect (length, 5 feet 3 inches), portion of basket-work, and some wooden dishes with handles.

Pottery.—The ceramic art is poorly represented here; only fragments of a coarse quality, and ornamented with finger or string marks, are recorded. (B. 462, Pl. ix. 4.) Two clay cylinders are in the Museum at Bern, like those from Wollishofen (**Fig. 5,** Nos. 5 and 10), together with some perforated clay weights.

In the neighbourhood of this station there are some ruins of Roman buildings, a fact which is suggestive as an explanation of a quern or millstone made after the Roman fashion, which is reckoned as a relic from this lake-dwelling. From systematic investigations carried on here in 1884, Dr. v. Fellenberg concluded that the station belonged to the transition period, like Vinelz. (B. 462, p. 34.)

LATTRINGEN.—Dr. Gross describes two stations here, both of which, from the prevailing character of the antiquities, appear to have belonged to the Stone Age, although previous to his investigations some bronze objects were said to have been fished up from one of them by Colonel Schwab.

The first, or lower station, covered a space of some 5 acres, and its remains are situated opposite the little port of the village of Lattringen. It was connected with the shore by four bridges, the largest of which was 65 yards long and 14 feet wide. The relics collected by Dr. Gross are of the Stone Age, and among them are staghorn haftings and a fine harpoon with 11 barbs and a perforation at its obtuse extremity. According to Fellenberg, this station belonged to the middle Stone Age period, as it has yielded no copper implements, nor perforated hammer-axes, but on the other hand most excellent nephrite implements. (B. 462, p. 35.) The collection of objects from this station in the Cantonal Museum at Bern contains among other things:—Daggers, chisels, harpoons, and pointers of bone and horn; some perforated horn hammers and horn holders for stone axes (only two of which have the end split); a number of flint arrow-points, all flat based. A few stone beads and bits of rock crystal. One small dagger-blade with four rivet-holes is of bronze or copper.

Previous to Dr. Gross's report, the following objects have been recorded as coming from this station:—Mealing-stones, fragments of coarse pottery, a bronze dagger, a shovel-shaped bronze axe, and a spiral ring, also of bronze. (B. 15, p. 95.) The upper station is 500 or 600 feet from the former, just opposite the erratic block known as the *Sumpfstein*. It contained a small steinberg, and yielded fine lance-heads of flint, a stone axe of serpentine sharpened at both ends and perforated with an oval hole, and one or two horn objects. (See **Fig. 186,** Nos. 7 and 11.)

MOERINGEN.—Judging from the number and variety of antiquities collected from Moeringen, it must be ranked as the most important station in Lake Bienne. The settlement occupied a sheltered bay called the "Moeringen Ecken," and covered a rectangular area about 550 feet long and 350 wide. The relic-bed was covered with eight or ten inches of sand and mud. When discovered, and during the earlier years of its investigation, piles were seen protruding more or less out of the mud, and among them could be readily distinguished the ends of several canoes. Investigations have been made here almost every favourable season since its discovery by Mr. Müller in 1854, but in the winter of 1872-3 Government took the matter into their own hands, and conducted systematic explorations under the care of Messrs. Fellenberg and Jenner. It then became apparent that there were two stations in this bay—one belonging to the Stone Age, and another to the Bronze Age—between which a well-defined distinction could be made, especially in respect of the piles. The former occupied a position nearer the shore, and the stumps of its piles were hardly visible; while the latter was in deeper water, and its piles, less decayed than the former, projected 1½ to 2 feet above the lake sediment. Both had bridges extending to the shore, as was indicated in each case by the remains of a double row of piles. But while the bridge of the Stone Age settlement was 5 to 8 feet wide, that of the Bronze Age was 10 to 12 feet wide, and moreover it was much longer, being over 200 yards in length. Dr. v. Fellenberg calculates, from counting the piles in one or two selected places, that for the entire bronze settlement somewhere about 10,000 piles must have been used.

The exploration of the settlement at Moeringen undertaken by Government was continued in 1874, by which time the level of the lake had fallen to such a degree that most of the bronze station was laid dry, and many additional relics were added to the already large collections from this station. Among the more interesting may be mentioned some burnt boards and posts with square holes, supposed to indicate the position and remains of huts or workshops. (B. 271.)

The earlier investigators, Col. Schwab and Mr. Müller, collected from this station a number of objects, now deposited in the Schwab Museum, among which are the following:—An iron sword of the La Tène type, and a curious iron fork. Of bronze, there are knives, hair-pins, and a variety of pendants. Some beads of glass and amber. Novel specimens of earthenware; charred apples, grains of wheat, and beans; ropes and cords made of flax and bast; etc.

The smaller station, according to Fellenberg, belonged to the middle Stone Age period. A number of stone beads, some of white quartz, were found in a contracted space, which are supposed to have formed a necklace. (B. 462, p. 36.)

The two best collections from Moeringen are in the Cantonal Museum and in the Federal Government rooms (Gross collection), both at Bern.

Of the very remarkable antiquities found here, Dr. Gross (B. 286) gives a full account, classifying the objects under the following heads:—

1. *Arms.*—Swords (**Fig. 186,** Nos. 4, 5, and 6), daggers, lances, arrows.

2. *Instruments.*—Hatchets, sickles, polishing stones, discoidal stones, anvils, spindle-whorls, and weaving weights.

3. *Objects of Dress.*—Girdles and belt-buckles, hair-pins, fibulæ, bracelets, rings, earrings, beads of amber and glass, etc.

4. *Objects belonging to Horses' Harness.*—Bridle-bits of bronze, iron, and horn; phaleræ. (See **Fig. 191,** Nos. 3 to 7, and 13.)

5. Pottery, crescents, etc.

6. Sundry objects.

As specimens of the bronze relics from this station, I give the illustrations on **Fig. 6,** selected from the beautiful coloured plates of Desor and Favre. (B. 252.) The purpose of these objects is sufficiently manifest without entering on a detailed description. I will only remark that the unique dagger, the handle of which is here only represented (No. 5), consists ot a stout bronze rod twenty-one inches long, pointed at one end, and becoming quadrangular at the other, where it enters a socket in the handle. The free end of the handle terminates in a fixed ring, on which are three movable rings; and on its body there is a secondary handle, with a curious curved appendage in front of it.

GERLAFINGEN (GEROFIN).—There were two settlements here also—one of the Stone Age, covering little more than half an acre; and the other of the Bronze Age, of much larger dimensions and farther from the shore than the former. The stations had separate bridges, the remains of which again

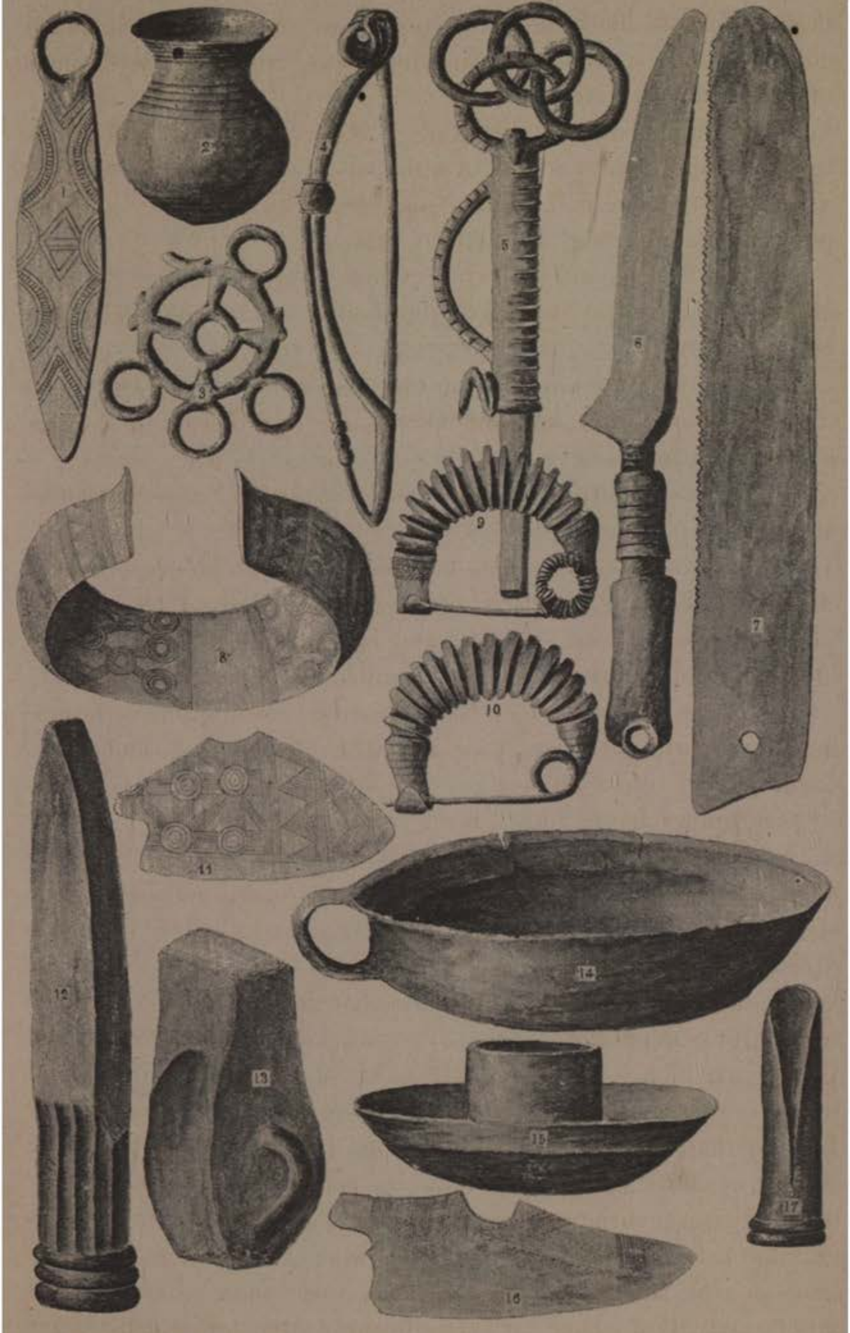

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Fig. 6.—Moeringen. All bronze and ½ real size.

suggested that these approaches were larger during the Bronze Age. The Stone Age station was covered with mud, and the relics from it consisted of stone celts (one perforated), flint flakes, and some fragments of coarse pottery.

The second station (Unter Station oder Oefeliplätze) contains a steinberg which communicated with an adjacent tongue of land by a bridge. There was no well-defined relic-bed, but the relics picked up are of great value, among which are the following[*]:—A number of nephrite and jadeite hatchets, a nephrite knife in its horn handle, flint knives, a wooden spoon, a miniature canoe, four copper chisels (B. 286, Pl. ix. 34 and 35), two flat hatchets of bronze, showing rudimentary wings, a double-stemmed hair-pin (B. 286, Pl. x. 2), two daggers of bronze, one triangularly shaped (B. 286, Pl. iii. 17), a massive bracelet of bronze, some staghorn hammers, a scoop, some large clay weights, etc. In the Bern Museum are thirteen beads of copper, graduated so as to form a necklet; some arrow-heads of rock crystal; an ammonite and another shell (pectunculus), both perforated; also some perforated small bones, teeth, and beads of horn. (B. 462, p. 64, and Pl. xiv.) Dr. Gross estimates the number of jade implements from Oefeli at thirty or forty, the largest being four inches long, and the smallest one inch (both of nephrite).

Piles were found in various spots in this locality; and associated with one group were Roman remains, such as fragments of tiles, pottery, coins, and bits of glass.

HAGNECK.—In this locality, near where the Aar now debouches into the lake, and about one hundred yards from the shore, were formerly to be seen some piles, but the relic-bed seemed to have been washed away. Desor found some stone hatchets and a few other relics. The station was connected with the shore by a bridge sixty-five yards long and thirteen feet wide.

ILE DE ST. PIERRE.—On the south side of this island there are remains of an extensive settlement, the piles of which run parallel to the bank. A large canoe was observed here, lying in the mud, apparently having been swamped with a load of stones, with which it still was filled. It was 50 feet long, and 3½ to 4 feet wide. Near the piles a bronze pin with an oval head, and ornamented with wavy lines, was picked up.

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[*] *Matériaux*, vol. xvi. p. 257.

Another station was on the north-east side of the island, which is now dry, and on which a large number of bronze objects was collected; but there was no regular relic-bed, and as the objects were gathered on the surface, Dr. v. Fellenberg thinks it has been washed away. (B. 462, p. 31.) Among the relics are a bronze knife, a compound pendant curiously arranged (B. 286, Pl. viii. 3), a pair of pincers, portion of a chain consisting of rings and bands, and several fragments of swords, celts, and sickles; also an iron sword with the handle of bronze.

On the south side of the Ile des Lapins there are some piles, which point to this being the site of a station, but on the island itself antiquities of various ages have been collected, such as Roman roofing tiles and coins, a pretty gold ornament, and many objects of Gallo-Roman manufacture.

LOCRAS (LÜSCHERZ).—Owing to the depth of water over the ruins of the settlement opposite this village, the station, although known to Colonel Schwab, did not assume any importance till the winter of 1871-2, when the waters commenced to fall, and the Bernese Government undertook a series of investigations. The extent of the settlement was estimated by Dr. Gross at about four acres, and it had been connected with the shore by a short bridge. The relic-bed, four to twenty inches thick, lay under a considerable accumulation of sand and gravel, and consisted of a blackish stratum of organic *débris*, which appears to have been peculiarly favourable for the preservation of the usually perishable objects of human industry. It is therefore singularly rich in such remains, and has furnished balls of linen thread, fragments of cloth made of flax, heaps of grain, and various remains of cultivated plants.

In prosecuting the exploration of the station it was found that the relic-bed became more deeply buried the farther it was pursued outwards; so that from 2½ feet, its depth on the shore side, it gradually increased to 7½ on the opposite side. The piles were of oak, beech, silver fir, pine, poplar, and birch, mostly in the form of round stems. All these different kinds of wood appear to have been used in nearly the same proportion all over the settlement except at the north-west corner, at a place called the steinberg, where the piles were entirely of split oak stems. Another peculiarity was that the piles were more superficial, and hence it was suggested that this corner was of later date. Like most of the other lake-dwelling settlements, the wood-work showed marks of burning. The theory of some sudden catastrophe, such as a general conflagration, was strengthened by the number of human remains—no less than three skulls and some bones of the trunk and extremities—that were found at a depth of 3 feet.

Among the antiquities recorded by Dr. Gross (B. 286) the following may be mentioned:—

Stone.—Several hundreds of polished celts, about 30 of which were jadeite or nephrite; flint implements of black and yellow flint, and beautifully formed, such as lance-heads, arrow-points, saws, and flakes; some round pebbles, about the size of a pigeon's egg, encircled with birch-bark, and arranged in a row, like peas in a pod; spindle-whorls, corn-crushers, etc.

Horn and Bone.—A large number of haftings, probably from 600 to 800, many still retaining a stone celt or chisel; about 40 axe-hammer heads, perforated with a square or round hole; two little combs with three teeth; chisels, needles, awls, bodkins, arrow-points; a carding implement made of a number of small ribs pointed at one end and tied together, etc.

Pottery.—A large number of entire vessels and fragments show that two qualities of paste were used, a coarse and a fine kind. Among them are bowls, plates, jugs—some having the ordinary handle and others perforated knobs; clay weights, round, cylindrical, or conical.

Sundry Objects.—Portion of a spindle with the thread wound round it (carbonised), various wooden handles, dishes, and implements; fragments of cloth, matting, burnt straw, etc. One small flat dagger of copper is in the Bern Museum.

The following extract from the Government Report by Mr. Jenner, Dr. v. Fellenberg's deputy (B. 119, 2nd ed., p. 203), gives a good idea of the comparative numbers of these relics:—"The results of my excavations, which occupied 27 days, and extended over an area of 20,000 square feet, at a medium depth of 3½ feet, the relic-bed being from 2 inches to 1½ foot thick, were as follows:—

1. Stone implements	600
2. Staghorn do.	480
3. Bone do.	235
4. Pieces of cloth	50
5. Objects for ornament	45

6.	Entire vessels of pottery	11
7.	Stone celts and axes in their haftings	23
8.	Flint implements	121
9.	Unworked pieces of staghorn	430
10.	Wooden implements	24
11.	Ornamented potsherds	26
12.	Clay weights	8
13.	Celts of nephrite and jadeite	8
14.	A number of net-weights in birch-bark.	

Contiguous to the station just described, on its north-east side, and separated from it by a dozen paces or so, there came subsequently to light another station, described by Dr. Gross as "Une nouvelle palafitte de l'époque de la pierre à Locras." (B. 336 and 347.) Its area was only about a fourth of the former, and the relic-bed, being quite near the surface, was easily worked. Two human skulls were found here, one of which appears to have been used as a drinking-cup. From the character of the relics generally, the settlement seems to have flourished during the transition period. There were perforated axe-hammer heads, with grooves and raised ridges, like Scandinavian forms, and a few metal objects. The latter consist of three articles of copper —a remarkable double celt of large size (**Fig. 186,** No. 10), a dagger, and an awl—and three articles of bronze, viz. a sword, a dagger-blade, and a hair-pin. The other objects are of the usual Stone Age type, among which may be noted as of rather uncommon occurrence an arrow-point of nephrite (B. 347, Pl. ii. 9), and a knife of the same material with one cutting edge (**Fig. 185,** No. 28).

VINELZ (FENIL).—This station, which is now entirely on dry land, was accidentally discovered in 1881 by labourers while digging a ditch to carry off water accumulating on the fields.* At a depth of two or three feet of sand and gravel they came upon a blackish bed of mud-earth, in which were detected a number of piles, the heads of which projected upwards into the sand and gravel for about a foot. Dr. Gross, who was informed of the circumstance, soon visited the spot, and at once recognised the site of a lake-dwelling. It appears that the locality is much exposed to the north winds, and that the settlement had thus become completely covered over with sand and gravel thrown up on the shore, as was the case with the station of Wangen in the Untersee. During the spring and summer of 1882 the new Pfahlbau was investigated by several experts, including Drs. Gross and v. Fellenberg. The station is remarkable for the number of copper objects which it has yielded to the systematic explorations ordered by Fellenberg, and carefully conducted by Ed. Matthys, of Ligerz. From the results thus obtained, the station at Vinelz is the most typical yet discovered of the final Stone Age period (*Uebergangszeit*). (B. 462, p. 33.) The following are some of the antiquities collected, most of which are in the Cantonal Museum of Bern and the Gross collection.

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* Dr. Gross in *Corresp.-Blatt*, 1882, p. 99.

Among nearly 100 copper objects (including 46 beads, **Fig. 7,** No. 31) are several daggers (Nos. 26 and 28), flat axes (No. 27), chisels (No, 24), rude knives, awls (Nos. 17 and 25), pendants (No, 23), tubes and spirals (Nos. 22 and 30). No bronze or iron object has yet been found on this station. Bone and horn handles, polished daggers, large button-like objects (Nos. 20 and 21), perforated clubs, ornamental pins (Nos. 15, 16, and 18), etc,, are numerous. Perforated stone axes and the ordinary polished celts are common (about 40 of the former and 100 of the latter being in the Bern Museum). Flint daggers, sometimes worked at both ends (No. 12), are also very fine; two were found in their wooden handles (No. 11). For more firmly fixing them a fine band of reed or withe was neatly rolled round the handle. A variety of flint arrow-heads, scrapers, etc. (Nos. 1 to 9), clay weights of different forms, implements of pointed ribs, basket-work, etc. For bits of well-woven cloth, thread, and fishing-nets, this station vies with Robenhausen. A portion of a spindle has some thread still round it. There was an entire fishing-net (carbonised) associated with a number of stone sinkers.

The pottery (Nos. 29, 32, and 33) was ornamented with dots and string-marks. One vessel had a horn-shaped handle projecting from the body of the vessel.

Wooden objects are also well represented in the form of dishes, clubs, handles, and net-floats. One portion of wood had some pointed flints stuck in it with resin, which had evidently been used like a saw (**Fig. 185,** No. 17), finger-marks having been cut out in the wood, by means of which the instrument could be more readily grasped.

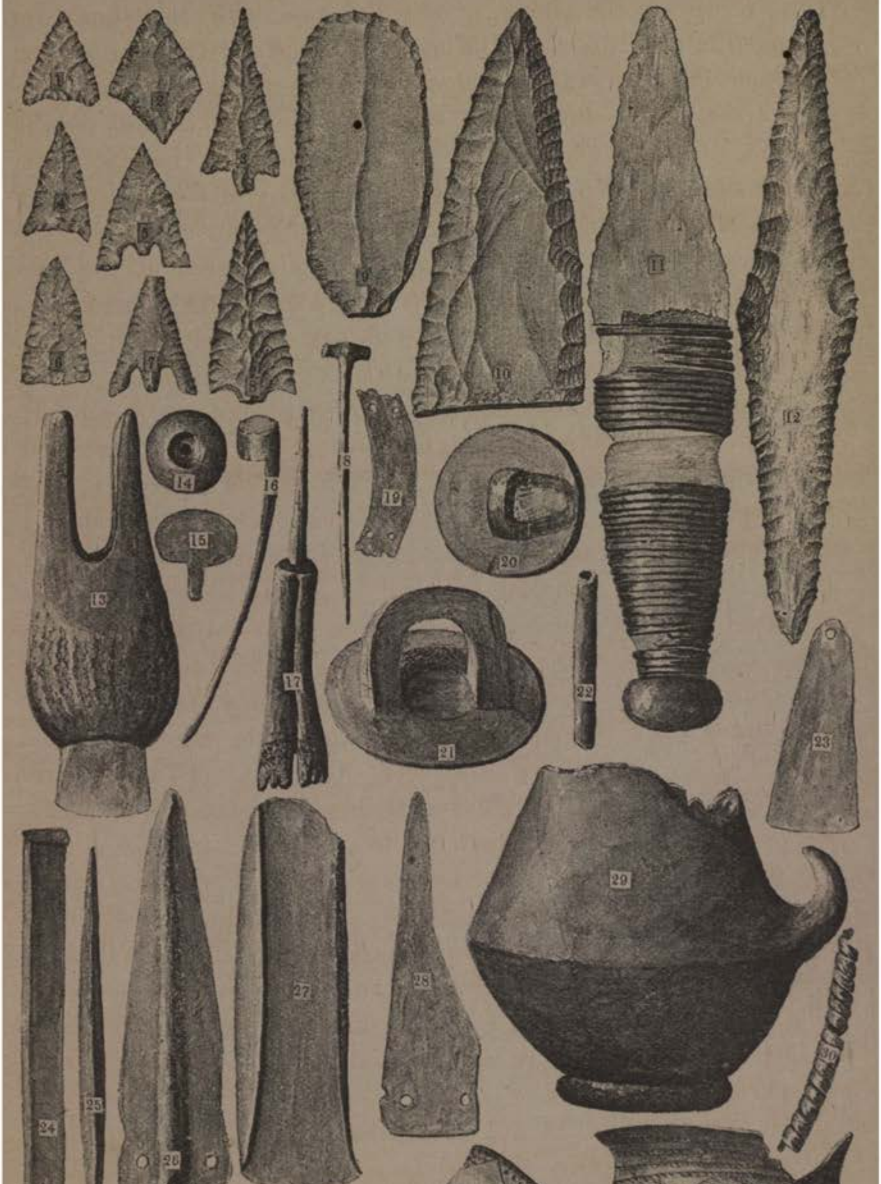
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Fig. 7.—Vinelz. Nos. 29, 32 and 33 = 1/4, the rest = 1/2 real size.

Saint Jean.—A little less than a mile from the lake, in the marshy plain, some bronze objects were found, which point to this as the site of a station. Below Landerdon there are also some piles, the tops of which are much decayed and deeply buried in mud. Dr. Gross is reported to have found here a sword of the Middle Ages.

Schaffis (Chavannes). — This settlement stretched as a narrow band on the left bank of the lake, and though known for a considerable time it remained unexplored till the lowering of the water facilitated its investigation. This was done by Dr. v. Fellenberg, in 1873, on behalf of the Government. (B. 271.)

Three steinbergs were found on its site, two of which were close together. In the vicinity of these steinbergs the piles were placed in rows running outward into the lake. Elsewhere they were irregularly but closely placed, seldom more than two feet apart, and penetrated deeply into the old black lake-sediment. Few timbers were met with, though twigs, basket-work, and charred food, were common.

The total length of the station was 640 feet, and greatest breadth 167 feet. The largest steinberg measured 217 by 65 feet. Several bridges, from 30 to 60 feet in length, connected the piled area with the shore. The station is now completely dry, and overgrown with vegetation.

On the steinbergs the relic-bed was quite superficial, being covered only with a thin layer of sand and gravel. The organic remains, such as staghorn haftings and bone implements, were of a blackish colour, and so much decomposed that few could be preserved from crumbling into pieces. Stone celts were very numerous, but unusually small, as, out of several hundred specimens, only a few reached the length of 5 or 6 inches. The majority were only 3 inches long, and although well polished and sharpened along the cutting edge, they were of inferior workmanship when compared with those of some other stations, such as Locras. They were all manufactured of materials readily found in the surrounding country, with the exception of three jade implements (two jadeite and one nephrite). Large slabs for grinding and polishing these tools were remarkably abundant.

On the other hand, the station is prominent for the beauty and elegance of its flint implements, many of which were, when found, still in their horn or wooden handles. Along with the horn haftings may be mentioned perforated hammers, chisels, barbed harpoons, pins, awls, flax-heckles, amulets, perforated teeth, and boars' tusks of great size. Among wooden objects the most remarkable are a wooden door, still retaining portion of a polished oval bolt of yew which traversed it horizontally (B. 336, p. 48), and a portion of a ladder (B. 347). The fragments of pottery indicated not only coarse material but rude workmanship. The clay is badly burnt, and it is uniformly mixed with pieces of quartz or small pebbles of the size of a pea. The vessels are roughly cylindrical, and have thick bases, but no ornamentation, not even the projecting knobs so characteristic of Locras. Some large clay balls, perforated in the centre, are probably loom-weights, and among the remains are bits of plaited and woven flax, which prove that the art of weaving was well known to the inhabitants. Dr. v. Fellenberg, from whose writings I have taken the substance of this notice, considers the settlement one of the earliest among the Swiss lake-dwellings and much inferior to some of the other Stone Age settlements in Lake Bienne.

A cup made from the upper part of a human skull found here has attracted much attention. (B. 119, 2nd ed., p. 221.)

TWANN (DOUANNE).—It must be remembered that the west side of the lake does not present the same facilities for pile-dwellings as the opposite shore, owing to the steepness of the immediate shoreland and the rapidity with which deep water is met with. Moreover, the narrow strip of beach available for the purpose has become greatly covered up with alluvial deposits, as is proved from a discovery made at Twann. Here, at a depth of 15 or 20 feet, some workmen, while making excavations in connection with railway works near the quay, came upon a blackish bed of mould containing piles, pottery, staghorn implements, etc., which, on being inspected by Dr. Gross who happened to be passing at the time, was at once recognised as the site of a lacustrine station. Mr. Irlet, of Twann, has also discovered another station at Wingreis, in the vicinity of which the canoe, now so well preserved in the Museum at Neuveville, was found. (See page 481.) The objects from Wingreis consist of stone hatchets, flints, and horn handles. (B. 462, p. 32.)

In 1886 another station, called "Bipschal," was announced by Dr. v. Fellenberg as having been discovered by Ed. Matthys between Ligerz and Twann. (B. 462, p. 35.)

VINGELZ.—Dr. v. Fellenberg states (B. 462, p. 32) that in 1874, when the great canoe which for many years was known to be lying in the mud near Vingelz was raised, a deeply-buried relic-bed was brought to light.

Nearly 3,000 feet from the shore, and opposite the steinberg of Nidau, there is what is supposed to have been a small station, on which a few objects were found, among which is to be noted a great stone weight with an iron ring round it. A group of piles was observed to run from it in the direction of the Nidau steinberg, and hence it is conjectured that a bridge formerly connected the two. (B. 15 and 22.)

Between Vingelz and Bienne there is a small steinberg, on which a few arrow-heads of iron are said to have been found.

PORT.—During the excavations for the "Correction des Eaux du Jura" some remarkable discoveries were made, especially along the Lower Thielle, between Nidau and Meyenried. Immediately below the little village of Port the remains of a palafitte of the Stone Age were met with. The station appeared to have been of considerable extent, as the piles were traced for several hundred yards along the line of the canal. The relic-bed was 7 feet below the surface, and amongst its *débris* were found various implements of stone and horn. Among the stone celts was one of nephrite, still in its horn fastening, the handle of which was covered over with a bluish coating of amorphous vivianite. (B. 446, p. 11.)

LAKE OF NEUCHÂTEL.

The Lake of Neuchâtel, like that of Bienne, was studded with lake villages, particularly in the more sheltered localities. From data collected by Col. Schwab a chart was constructed and published in 1863, showing no less than 46 stations in the lake; but many of them were of little archæological value beyond giving indications of their existence. Since then some additional sites have been added to this list, and from the activity with which lacustrine researches have been conducted, especially after the lowering of the water by the "Correction des Eaux," many of the supposed less important sites have turned out extremely rich in antiquities.

PONT DE LA THIELLE.—Leaving the Lake of Bienne, and following the Upper Thielle, we come to the Pont de la Thielle

(Zihlbrücke), which crosses the river at a short distance below where it emerges from Lake Neuchâtel. A little above this bridge and on both sides of the river, Col. Schwab discovered piles, among which he collected some industrial remains at a depth of 5 feet, from which he concluded that there had been here an ordinary pile-dwelling, in what was then probably a bay of the lake. With the exception of one hair-pin of bronze, the objects collected were of the Stone Age. (B. 32.) In 1870 v. Fellenberg made some further investigations, which, while justifying the conclusions previously arrived at, showed that the station had larger dimensions than were formerly suspected, and that the relic-bed was in some parts deeply buried. He enumerates the following relics as the result of his labours:—7 large stone axes and 9 small or imperfect ones, of serpentine, diorite, etc.; 20 implements of bone—pointers, daggers, chisels, etc.; a large number of staghorn axe-hammer heads (perforated); flakes of flint and other flint implements, and one beautifully-worked arrow-head; a knife of polished nephrite. The pottery indicated a coarse paste mixed with rough sand, and some of the vessels were ornamented with knobs. (B. 196, p. 281.)

According to Mr. Dardel-Thorens,* a Roman station succeeded the palafitte, as many objects of pure Roman origin were found amongst the piles on the right bank. Among these he mentions a lion head of bronze, portion of a girdle, a silver ring like those from Pompeii, knives, chisels, axes, etc., and a tile with the legion mark CLXXI; also a piece of worked horn with figures.

LA TÈNE (STONE AGE STATIONS).—Close to the outlet, on its north side, is the celebrated station known as La Tène, which, from the remarkable character and varied assortment of iron implements found on it, has given a name to a well-defined period of the Early Iron Age. Now that the lowering of the level of the lake has left its site on dry ground, and its exploration has become thus greatly facilitated, it would appear that La Tène was more of a stronghold, commanding a bridge which crossed the Thielle at its outlet, than a real pile-village. Its consideration will therefore be deferred till we come to the description of the lake-dwellings of the Iron Age.

Making a circuit of the lake westwards, we come at once on a series of four stations, the ruins of which lie scattered on the shore between La Tène and the promontory of Préfargier. Their *débris* lay embedded in a thick bed of ancient mud, which has since become undermined, and almost entirely washed away by the waves, leaving the heavier antiquities amongst the rolled pebbles. Some beautiful implements of nephrite and jadeite, and occasionally copper objects, have been thus picked up, some of which are still in the possession of Messrs. Vouga, Dardel-Thorens, and other local collectors.

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* *Antiqua*, 1884, pp. 42 and 85.

St. Blaise.—This station has only come into prominence since the operations for the "Correction des Eaux du Jura" took effect on the lake; and although its investigation has been somewhat desultorily conducted, the finds from it are extremely interesting, as they are characteristic of the period of transition. The settlement was situated to the west of the town of St. Blaise, and appears to have occupied a large area, as piles extended more or less all the way to Hauterive. Its chief explorers and relic-holders are Messrs. Vouga, Zintgraff, and Dardel-Thorens. In 1878 Dr. Gross published a description of its relics with two plates of illustrations, and subsequently a notice of it appeared in the *Anzeiger* (B. 376a) and *Das Ausland* (B. 418, p. 49). Among some thousands of stone axes, of which about ten per cent. are perforated, there are many of nephrite, jadeite, chloromelanite, and *saussurite*. These latter are generally small, and set in horn fixers with a split at the end. The perforated hatchets (one of which is an unfinished specimen, with the core still in the hole) have often one end formed into a hammer (**Fig. 8,** Nos. 25 and 26). Among the many worked objects of horn and bone, such as pins (Nos. 22, 23, and 24), perforated clubs (No. 20), and daggers or spear-heads (No. 21), are some curiously-wrought pieces, which suggested to Dr. Gross the idea that they were part of a machine for boring holes in hard substances. The chief interest, however, lies in the number and variety of copper objects which this station has yielded. Out of about a dozen articles of metal, only one is said to be bronze (No. 4)—a dagger with a well-defined midrib—while the rest consist of two flat axes (Nos. 6, a fragment, and 14), six daggers after the type of the flint weapons (Nos. 1 to 5, 7, and 9), a knife (No. 8),* a bit of a spiral (No. 18), an arrow-point with some asphalt still adhering to it (No. 16), two small awls (Nos. 15 and 17), two earrings (Nos. 11 and 12), and two beads (Nos. 10 and 13).

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* *Antiqua*, 1884, p. 59.

One of the copper daggers was mounted in a handle of withes, the remains of which are still to be seen (No. 2), and

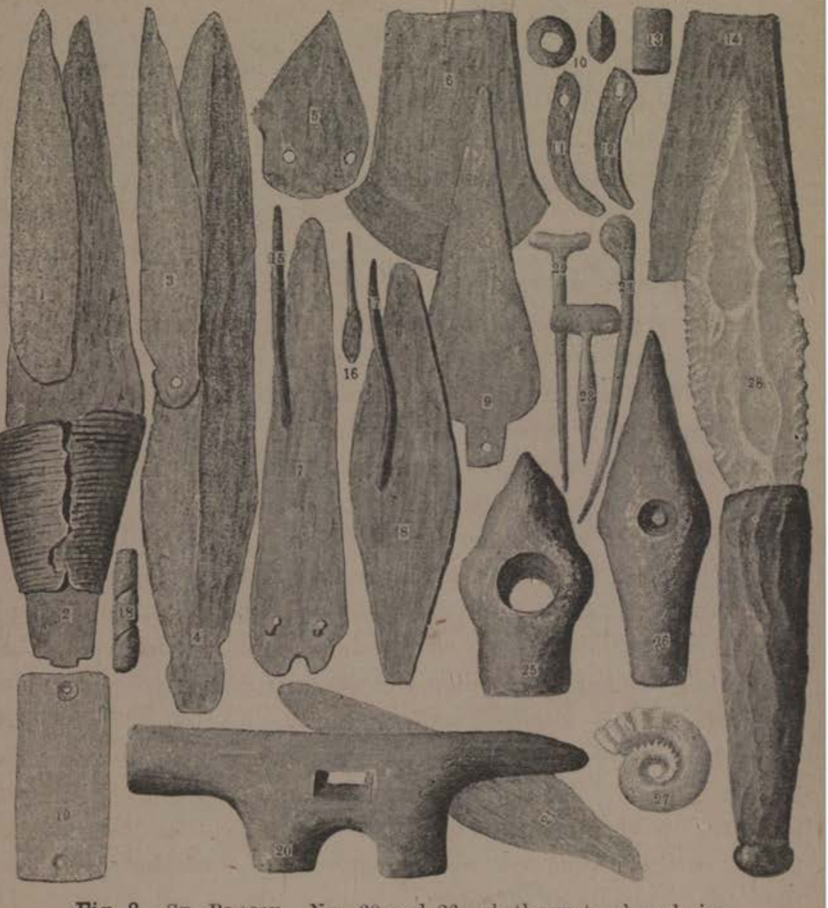

Fig. 8.—St. Blaise. Nos. 20 and 26 = ¼, the rest = ½ real size.

strongly reminds one of the flint daggers when similarly mounted, as seen in No. 28. As ornaments from this station I have figured a fossil ammonite and a smooth stone, both perforated (Nos. 27 and 19). Two fossil shells, an ammonite (**Fig. 185,** No. 23), and pectunculus, are described in the Ninth Report on the Pfahlbauten (B. 462) as coming from Oefeliplätze.

Hauterive.—Opposite the village there was a very large settlement, which has yielded a considerable number of antiquities of a mixed character, chiefly dispersed among the Museums of Neuchâtel, Bern, Bienne, and Zürich. Col. Schwab found two iron spear-heads and pottery. After Schwab's investigation, Desor searched the station and found a steinberg. Among the more interesting objects are:—a small figure shaped like a duck and ornamented with strips of tin (**Fig. 195,** No. 13); a vase, also ornamented in the same way (**Fig. 193**, No.-6); a disc of bone ornamented with concentric circles, and some bronze pendants (**Fig. 189,** Nos. 13, 14, and 16). In Bern there are four pins with large heads, and several tanged knives, sickles, bracelets, pendants rings, fish-hooks, etc.; also dishes of fine black pottery with round bottoms.

Between this and Neuchâtel are three stations, viz. Champréveyres, Monruz, and Crêt, on which a few objects have been picked up. In 1885 a pot of dark pottery ornamented with circular lines and triangles ("*Wolfszahn-ornamenten*"), measuring 6¼ inches in diameter and 4¾ in height, was fished up in eight feet of water, and was supposed to be from the bronze station of Champréveyres.* The pot contained sand and the following objects:—two stone celts, a spindle-whorl, a pierced boar's tusk, half of a stone axe-hammer partially bored, two objects of stone, a bit of red ochre, and a bit of yellow ochre.

AUVERNIER.—In the sheltered bay between Colombier and Auvernier was one of the largest and most interesting settlements in the lake. It was discovered early, and notwithstanding that its remains were covered with ten or twelve feet of water, it was minutely searched. Professor Desor ascertained that there were two distinct stations near the same place, one being a bronze station and farther out in the lake. The Stone Age settlement, which lay just between the latter and the shore, contained a steinberg of round and angular stones, and covered nearly two acres. The piles of the bronze station were inserted in soft mud, and their tops projected from one to two feet above the lake bottom. In one place a canoe and large masses of wattle-work were seen by Desor protruding from the mud. Among the antiquities collected by the earlier explorers are:—Arrow-points of various shapes with and without barbs, a richly-ornamented socketed lance-head, a solid ring armilla, a chisel,

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* *Antiqua*, 1885, p. 165.

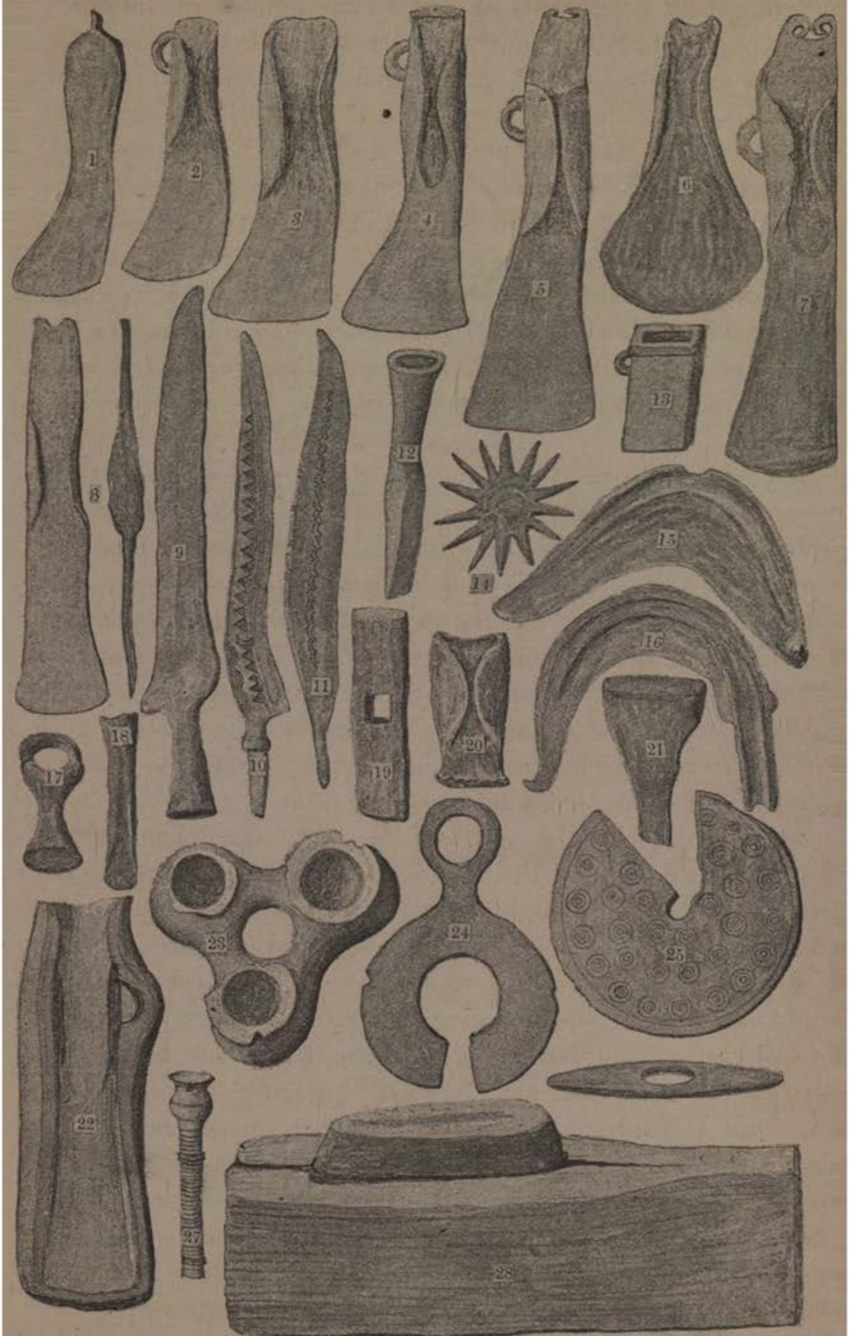
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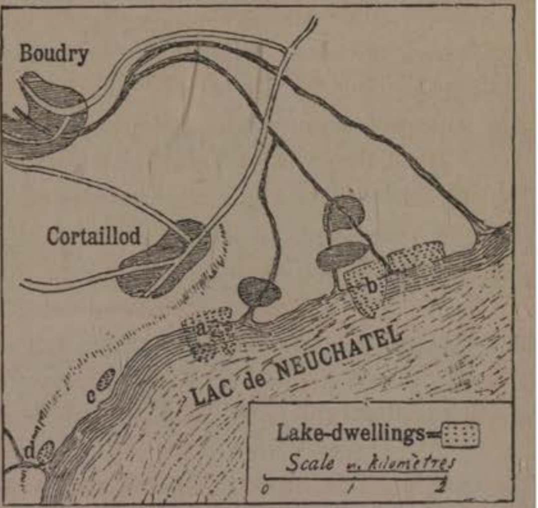
Fig. 9.—Auvernier. All ⅓ real size.

fish-hook, etc. Also fragments of variously-ornamented pottery, one of which showed something like the Greek pattern or meander line. Not less than twenty of the illustrations of Desor (B. 95) are of objects from this station.

The station was systematically investigated during the year 1873 and the three following years, and a report of the results was published by Dr. Gross in 1876. (B. 286.) He describes the antiquities under the following heads, from which it will be seen that the station ranks almost on a par with that at Moeringen:—(1) Arms, (2) instruments, (3) objects of dress, (4) objects belonging to horses' harness, (5) moulds, (6) pottery. Dr. Gross, at the eighth meeting of the German Congress of Archæologists at Constance, in September, 1877, gave some further account of the relics from Auvernier, particularly the swords, of which six were found. (B. 306.)

The illustrations on **Fig. 9** include a variety of axes (Nos. 1 to 8), knives (Nos. 9 to 11), a socketed chisel (No. 12), a gouge (No. 18); three hammers, one with a square socket and a side loop (No. 13), another with a square perforation in the middle (No. 19), and the third shaped like the upper portion of a winged axe (No. 20); two sickles (Nos. 15 and 16), a star-like ornament (No. 14), pendants (Nos. 17 and 24), half of a mould for an axe (No. 22), and an ornamental object (No. 27). All the above are of bronze, and of the remaining objects, one (No. 23) is a trilocular dish of pottery, two are of bone (Nos. 25 and 26), and the last (No. 28) is a stone anvil set in a wooden casing. The handle of one of the swords is illustrated on **Fig. 186,** No. 3.

CORTAILLOD.—We next come to the neighbourhood of Cortaillod, where there were several settlements. From Mr. A. Vouga's admirable and concise notices (B. 393 and 414a) of the more recent discoveries, it appears that the principal station (Station Principale, marked *a* on the accompanying Sketch Map) was nearly opposite the village of Petit Cortaillod, and consisted of two portions—one, nearest the shore, furnishing relics of the Stone Age; and the other, those characteristic of the Bronze Age. A few hundred yards to the north there was another large Stone Age settlement (Station de la Fabrique, *b*), also with a Bronze Age portion on its outer or lake side. On the south side of the principal station there were observed two small groups of piles probably remains of embryonic stations which were never completed (*c* and *d*). On one of these a remarkable wooden implement, supposed to be a pile-driver, was found, measuring 5 feet 4 inches in length (**Fig. 184,** No. 4).



The first exploration of the settlement commenced in the spring of 1858, when Mr. Troyon, after examining the stations near Yverdon, visited the locality and fished up five bracelets of bronze, together with some hair-pins and a few small rings, which are now in the Museum of Lausanne. Mr. Burki, of Petit Cortaillod, also found several bronze objects, some of which he sold to Agassiz.

These respective successes induced Col. Schwab and Prof. Desor to direct their attention to Cortaillod, who, in the course of a few years, made a collection of very remarkable objects. Among these the following are worthy of note:—a bronze wheel, 19¾ inches in diameter, with four spokes (**Fig. 10,** No. 17); the surplus jet of a bronze casting, broken off apparently after the operation was completed; several half-moon and other variously shaped pendants (Nos. 10, 12, and 21); bracelets (No. 14); a massive ring ornamented with concentric circles (No. 15); some large headed pins, earrings (No. 7), studs (No. 22), hatchets, sickles, fish-hooks, beads of amber and glass, a spoon of terra-cotta, etc.; but the most novel were dishes, particularly a large plate ornamented with tin strips arranged in various patterns of lines, circles, and the Greek meander (**Fig. 193,** No. 2).

Of the four brothers Kopp, who worked for these antiquaries, one afterwards commenced on his own account and sold the finds, and in this way many of the relics went to other localities. In 1874 a necklace of bronze was found (**Fig. 10,** No. 3), which Mr. Vouga states is still in the possession of a gentleman at Auvernier.

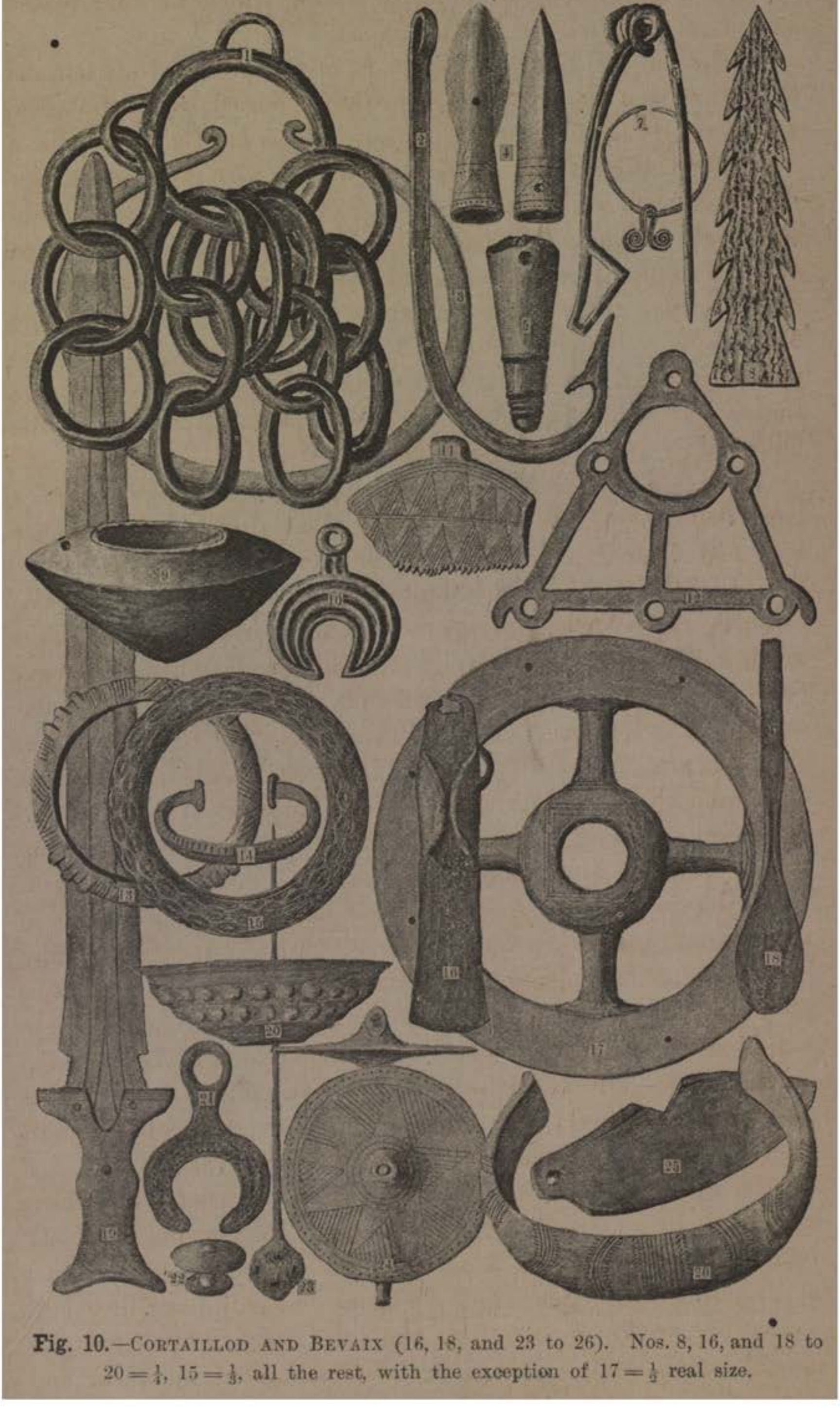

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Fig. 10.—CORTAILLOD AND BEVAIX (16, 18, and 23 to 26). Nos. 8, 16, and 18 to 20 = $\frac{1}{4}$, 15 = $\frac{1}{3}$, all the rest, with the exception of 17 = $\frac{1}{2}$ real size.

In 1876 a fisherman found a sword, which he sold to the keeper of the Museum at Bale (No. 19).

Meantime the Stone Age portion of the principal station was little examined, as the relics were deeply buried. Here, however, were formerly found some iron objects of the La Tène type, viz. a sickle (B. 31, Pl. xiv. 20), and a stone anchor with iron hoops, now in the Museum Schwab. In 1878, when the Government drainage works began to tell on the lake, many articles were picked up. Thereupon Messrs. Vouga and F. Borel commenced systematic diggings, and this set an example to the authorities of the Museum of Colombier and the Société du Musée de Boudry, who likewise started operations with a gang of workmen. Among the objects collected up to 1883 Mr. Vouga particularises the following:—

Stone.—A number of sharpening-stones of sandstone; a large hollow stone for bruising corn, measuring 1 foot 6 inches by 1 foot 9 inches, and 5½ inches in thickness, having a hollow 2½ inches in depth; some hundreds of hammer-stones, corn-crushers, etc.; portions of stone showing marks of having been sawn, and perforated net-weights; also spindle-whorls, an oval hammer of serpentine ornamented with chevrons; some perforated stone axes, etc.; about 1,200 plain axes, nearly a third of which were still in their horn fixtures. Most of these horn fixtures were inserted in wooden handles, but of course all traces of the latter were generally gone; only 12 nephrite implements were among them. About 1,500 chisels or small celts, only a few of which were of jadeite. One celt was of flint, a very rare thing in this district; and an arrow-point was of polished serpentine. Many thousands of implements of various coloured flints—saws, knives, scrapers, daggers, and arrow and lance-heads. The arrow-points were generally triangular without wings, and a few were lozenge-shaped. The largest flint dagger measures 9 inches in length (Museum Colombier); and some of the saws were still fixed in their handles with asphalt when found.

Horn.—Some 3,000 fixtures for stone hatchets, of which about one-third were perfect. These implements are not bifurcated at their end, as is often the case with those found at Auvernier and elsewhere; and many are only partially made, so that one would suppose there had been here a factory for their special manufacture. There were also perforated hammers, and a great number of chisels, pointers, etc.; also some large plaques whose use is unknown. Out of twenty barbed harpoons one, 8½ inches long, has twelve barbs (No. 8), and one (now in the Museum Boudry) is unfinished. About a similar number of pendeloques or beads, and a few small objects like arrow-points.

Bone.—A great number of pointers and chisels, some of which were inserted into handles; quantities of awls, lance-points, and javelins; thirty daggers; some twenty perforated teeth of the wolf or dog; fifty tusks of the wild boar worked, and some set in handles; bundles of pointed ribs (flax-heckles).

Wood.—An oval cup of yew, 4 by 2¾ inches; others were found, but not preserved. A small hammer, and bits of basket-work.

Metal.—A small round copper armlet, and a flat bronze axe with a round cutting edge.

Pottery.—Fragments of a coarse ware, found everywhere and generally indicating roughly-made vessels; and a few perforated weights, cylindrical and round.

As the waters became lower, the bronze station became more accessible, and accordingly its investigation was begun by Messrs. Borel, of Boudry, and Kaiser, of Estavayer. Among the antiquities collected here are the following:—

Bronze.—Several hatchets and knives; four razors, of different types (one hammered from the fragment of a bracelet); five sickles; a bracelet ornamented with lines and concentric circles, and another closed (No. 13), also ornamented; three small bracelets; some buttons, studs, etc.; the tip of a scabbard (No. 5); several lance-heads, one ornamented (No. 4); two fibulæ (No. 6); many hair-pins, several hundreds of fish-hooks; a necklet made of twenty bronze rings, connected by a chain of copper; and a cup, now in the collection of Dr. Gross (No. 20).

Among other relics were fragments of cups, vases, and other dishes of ornamented pottery, some twenty clay supports, and hundreds of spindle-whorls, etc. No. 11 represents a pendant, the substance of which no one can determine, as it is neither stone, bone, horn, nor pottery.

In the autumn of 1884 the water was unusually low, and the piles, being left high and dry, presented such a singular appearance that many visitors were attracted to see the novel sight. Many objects were then picked up. One bracelet, ornamented with concentric circles, was sold for eighty francs. Among the other objects described by Vouga are the following: A large fish-hook (No. 2), 4¾ inches long; a piece of wood surrounded by two bands of copper; a bronze pin with perforated head, and another with flat head; a small vase with four holes (No. 9), a small lamp with a handle like a spoon, and a bronze pendant formed of eleven massive rings (No. 1).

Bevaix.—Several stations were known here at an early period, and some of the objects from them have been described by Troyon, Keller, and Desor. They consist of bronze celts (Nos. 16 and 18), sickles, hair-pins (Nos. 23 and 24), bracelets (No. 26), a razor (No. 25), clay rings, etc., which are now in the collections of Schwab, Desor, and others.

Since the lowering of the water in Lake Neuchâtel, the Messrs. Borel have systematically investigated and reported on the stations in the Bevaix district. (B. 445.) From La Tuilière to Treytel, a shore-line of about two miles, they describe seven separate localities containing stations, chiefly of the Stone Age. An excellent map accompanies their description; and had they added a few illustrations its value would have been greatly enhanced.

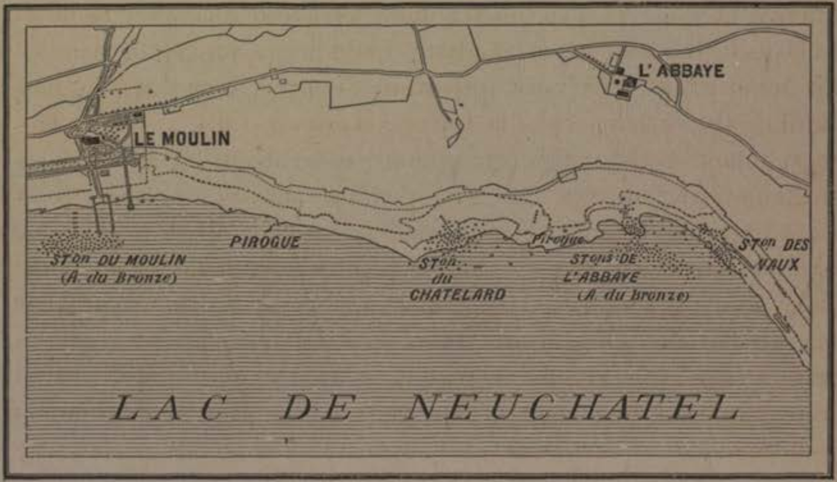
One of the greatest drawbacks to outsiders who wish to master the archæological results of the Swiss lacustrine investigations is the want of a correct map showing the area and distribution of the respective stations; and if this desideratum is ever to be supplied for those lakes that have come under the influence of the Correction des Eaux du Jura, there is no time to lose, as most of the stations are now on dry land and nearly obliterated by vegetation; and it is a work that can only be done by local archæologists, like the Messrs. Borel, who for years have had practical knowledge of the stations in their neighbourhood.

The accompanying Sketch Map (after that of Messrs. Borel) shows that, while the foundations of the two Bronze Age stations are still in the lake, all those of the Stone Age are entirely on dry land. This distinction was long ago pointed out by Desor and others, but it was only since the lowering of the lake that such a practical demonstration became possible.

The Messrs. Borel premise their acquiescence in the proposed subdivision of the lacustrine Stone Age into three periods, viz. a first or early period ("période d'établissement et de formation"), characterised by rudeness and simplicity of industrial remains; a second ("le bel âge de la pierre"), showing commercial and agricultural progress, and especially great skill in the manufacture of all manner of stone celts; and a third ("une période de transition"), which witnessed the introduction of metals among the lake-dwellers.

Typical examples of all these periods were found on the Bevaix district, as will be seen from the following notes, taken chiefly from the data supplied by the Messrs. Borel:—

(1) *Station de la Tuilière.*—This settlement belonged to the earliest lacustrine period, and, being much exposed to the winds, appears to have been quickly abandoned. The piles are much decayed and difficult to find, and the relics are few in number, and of a primitive type. Only rude stone axes, a few weights, and flints of a dark colour, are recorded.



Sketch Map of the shore of Lake Neuchâtel, near Bevaix, showing the relative positions of the stations of the Stone and Bronze periods.

(2) *Station des Vaux.*—Between La Tuilière to the Station des Vaux the promontory "Du Grain" intervenes, where, scattered on the shore on both sides of it, Roman tiles are met with. The remains of this pile-dwelling are situated near to a small spring of water, and directly below the rising ground, which is here covered with vines. The piles are disposed in two groups, and with scarcely an interval between them; but they represent two different periods of the Stone Age. The first or more eastern group stretches for 100 yards, with a breadth of 40 yards, parallel

to the lake; and though farther within the old lake basin, it is considered by Messrs. Borel the older of the two, being contemporary with La Tuilière and the earliest lacustrine settlements in the lake. A steinberg of broken stones marks its centre, but its examination has yielded only a few small stone celts, arrow and spear-heads of dark flint, and some coarse pottery. Among the osseous remains are some jaws of the beaver.

The second group occupied a smaller area than the previous one, and contained no steinberg, but, on the other hand, a well-developed relic-bed, some 12 to 16 inches thick, which was productive of relics of a decidedly more advanced character, such as well-made implements of staghorn, including a variety of handles for stone celts. The most important discovery here was a human skull of the dolicho-cephalic type. (*Antiqua*, 1884, p. 106.) The most inland piles of this group were only about 30 yards from the vineyards, whereas the corresponding ones of the first group were 70 yards distant. The anomalous statement that the second or more advanced Stone Age settlement was situated in an outer zone from the earliest (a fact which applies to all those explored on the Bevaix coast), Messrs. Borel explain by supposing that the lake area was gradually increasing since the earlier settlements were founded. We shall afterwards see that this supposition is well founded, on evidence that by careful observation could be greatly multiplied.

(3) *Station de l'Abbaye.*—A little farther on there is the site of another Stone Age station, presenting the same indications of an older and younger period, and also having the same relative position to each other as we have seen in the Stations des Vaux, viz. the older occupying a situation more advanced into the old lake basin. In front of these two stations, Des Vaux and De l'Abbaye, lie the remains of a large settlement of the Bronze Age, the piles of which, even when the lake is at its lowest, are still in several feet of water; it extends parallel to the shore, about 200 yards in length, and 160 in breadth. In addition to the relics found by the earlier explorers (Troyon, Desor, Vouga, Dr. Clement, etc.), and already noticed, the following bronze objects are recorded from the station, all of which are either in the private collection of the Messrs. Borel or in the scholastic museum at Bevaix:—

Six celts (one of which is socketed), portion of a sword scabbard, four chisels (some prettily ornamented), five sickles, twenty fish-hooks, three bracelets, two razors, 105 hair-pins (all sizes and forms), five pendeloques, two earrings, two buttons, two finger-rings, twelve large and 195 small rings, etc. Among the other finds are fragments of ornamented pottery, a clay support-ring, three glass beads, weights, sharpening stones, etc.

(4) *Station du Chatelard.*—This station contained a steinberg covering an area of 3,000 or 4,000 square yards, and was joined to the shore by a tongue of land, on which a series of stepping-stones were placed. The relics discovered on its site include some 200 stone celts (ten of which are jade), forty staghorn handles and fixers for celts, chisels, stone hammers, flint implements, etc. The special characteristic of the station is the appearance of the following bronze objects among these relics of the Stone Age, viz. a small perforated plaque, two hair-pins, four small daggers, three flat celts. Mr. Borel states that other celts of this type were found, one being to his knowledge in the possession of Mr. Rousselet, and one in each of the Museums at Neuchâtel, Bern, and Zürich. One here figured (**Fig. 10,** No. 18) is from the Schwab Museum at Bienne. Hence this station belongs to the period of transition, and is in many respects comparable to the Station des Roseaux at Morges.

(5) *Station du Moulin.*—Proceeding about 600 yards farther west we come to an isolated station of the Bronze Age, the piles of which are still over 50 yards from the present shore; and before the lowering of the water its site would be covered by about 16 feet of water. Owing to the scarcity of relics on this station, the duration of the settlement is supposed to have been short. Desor found here some ornamented specimens of the large hollow bracelet. Mr. Borel has only one small specimen and a portion of a large one of this type. The other objects of bronze are a couple of fish-hooks and a few pins and earrings. Fragments of pottery are, however, proportionally more abundant, among them being a vase, of elegant form, and polished exteriorly by graphite. To the east of this station a fine canoe was found in 1879, measuring 26 feet in length, now deposited in the Museum at Chaux de Fonds.*

(6) *Station du Port.*—The remains of this small station, which are exclusively of the Stone Age, are distributed on both sides

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* *Bul. de la Soc. d'Hist. Nat.*, vol. xi.

of a small stream which enters the ancient port of Bevaix. From the character of the relics the Messrs. Borel think that the portion on the east side belonged to the first lacustrine period, while that on the west was later. It would appear that the settlement had been dwarfed by the adjacent great palafitte at Treytel.

(7) *Station de Treytel.*—This station presents a fine example of the second Stone Age period. Its *débris* is found on the exposed shore, extending upwards of 300 yards in length, and covering an area of some 8,000 to 10,000 square yards. It was first examined in 1857 by M. Rousselet, who, notwithstanding its being then submerged, made the fine collection of objects from it now in the Museum at Neuchâtel. The flint implements are particularly well made, and the raw material, which shows a fine yellowish and partially transparent flint, is supposed to have been imported from Gaul. The horn handles and fixers for the stone celts are of varied forms, and there is also a rich assortment of other relics.

CHEZ LES MOINES.—Here there is a steinberg, but the antiquities found are unimportant, only a few staghorn implements and some stone celts. Fragments of Roman tiles were also found.

ST. AUBIN.—This station was near the shore, and contained a vast steinberg measuring 300 feet by 200. Its investigation was chiefly due to Dr. Clement, of St. Aubin, who made a splendid collection of its antiquities, which show that the settlement belonged almost exclusively to the Stone Age. Specially noteworthy among them are flint-saws in yew and staghorn handles; arrow-points, with portion of the shaft still attached with asphalt; a few beads—one of glass and two of amber; three small gold ornaments; perforated teeth of the bear and wolf or dog. Many of the objects from Dr. Clement's collection are illustrated in the second and third volumes of *Matériaux*, pages 511 and 259 respectively; as well as in Keller's reports. The horn fastenings are extremely varied, and those for celts, intended to be used with wooden handles, terminate either in a split or are squarely cut. The bone implements are particularly well made, and many of the pointers are fixed into handles. The arrow-points are also well chipped, and are of a longish or triangular shape. In the Zürich Museum there is a beautifully chipped dagger of flint, over nine inches in length, from this station. (See **Fig. 185,** Nos. 2, 3, 5, 6, and 9.)

CONCISE.—Mr. Rochat, who first examined the remains of this settlement, describes a semicircular* steinberg which occupied part of the station. (B. 34.) The convex part looked south and towards the lake. Its length was 459 feet, and breadth 255 feet, and when the lake was at its lowest (before the Correction des Eaux du Jura) its top was only a few inches below the surface of the water. The relic-bed was superficial, but the piles penetrated deeply into the mud. During the construction of the railway in 1859, which here passed through a small bit of the lake, a dredging machine was used, when antiquities of all kinds were collected in hundreds. These were generally sold on behalf of the workmen, and hence the objects from Concise are widely distributed, some having gone to America. On and around the steinberg the antiquities were of the Stone Age. Here the operation of dredging was carried on for six weeks amidst great archæological excitement, which led to the production of many falsifications. (B. 28, 31, and 39.) Among the vast quantity of industrial remains brought to light, there were objects of very diversified kinds, but all in this part of the station were peculiar to the Stone Age; such as saws, knives, and arrow-points of flint; hundreds of stone hatchets, mostly of serpentine, only two or three being of nephrite; perforated stone sinkers and hammer stones. Of bone and horn, there were chisels, pointers, daggers, harpoons, cups, etc. Among the pottery were circular dishes with perforated knobs, small and large vases, plates, and cups; also some vases with conical bases, with their corresponding clay rings. Clay balls, of the size of two fists and perforated, reminded Mr. Troyon of similar objects from Wangen.*

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* In 1861 Mr. Troyon carried on researches, under the superintendence of qualified persons, to prevent falsifications, which were frequently indulged in by the railway workers. And as the result, he enumerates the genuine objects collected as follows:—

A complete hatchet with a wooden handle, horn-holder, and serpentine axe; various horn handles, some bifurcated, still retaining their axes and chisels; a portion of wood pointed, fixed in a hatchet handle instead of the stone.
2 pointers of wood with horn handles.
6 hammers of staghorn, with remnants of their wooden handles.
8 bone arrow-points, with remains of *mastic*.

Among the animal remains were three fragments of human skulls and two jaws. Also one tooth of the horse.

During the last few days of these operations the dredging machine was shifted in a north-eastern direction, and here objects of bronze were turned up, such as hatchets, hair-pins, knives, buttons, spirals, beads, rings, etc.

It would thus appear that there were two stations—one of the Stone Age, and the other of the Bronze Age; or that a portion of the former survived during the Bronze Age.

It was in the vicinity of this station that Captain Pillichordy in 1832 dredged up a canoe and two beautiful bronze swords, only one of which is now known to exist in the Museum of Neuchâtel. In September, 1889, Dr. Evans showed me, among many other objects from the Swiss lacustrine dwellings, a sword from Concise, purchased by him in Paris in 1887, which at once struck me as being the other weapon which so mysteriously disappeared in 1832. The handle and the tip of the blade of this sword are here represented (**Fig. 11,** No. 24), and when compared with the drawings of its supposed fellow at Neuchâtel (B. 34, Pl. iii. 35; B. 119, 2nd ed., Pl. cii. 17; B. 31, Pl. xi. 11; and B. 252, Pl. v. 10), their remarkable similarity will be at once seen. That in Dr. Evans's collection has a total length of 26½ inches. The blade is of yellow bronze 21 inches long, and terminates in a somewhat rounded point.

In the months of January and February, 1885, a portion of the station hitherto unexamined became dry, and a great many objects were found, including bronze pins (**Fig. 11,** Nos. 2, 3, 8, 10, and 11), hatchets, bracelets, sickles, knives, pendants (Nos. 9 and 13), tin wheels (No. 4), wooden combs (No. 7), and vases, etc. Among the more remarkable objects described and figured by Mr. Vouga (B. 414d) are:—A necklace made of rolled

40 handles of horn for chisels, minus the tools.
200 axe-holders.
20 horn tynes used as chisels.
121 pointers of bone, from one to four inches in length.
46 chisels of bone.
4 boars' tusks, sharpened in form of a knife-blade.
Some bone pins and various ornaments.
145 hatchets and chisels of stone.
20 flint arrow-points and scrapers.
12 circular stones perforated; some rubbers and polishers.
Many bones of animals; but no trace of metal. (B. 39*a*.)

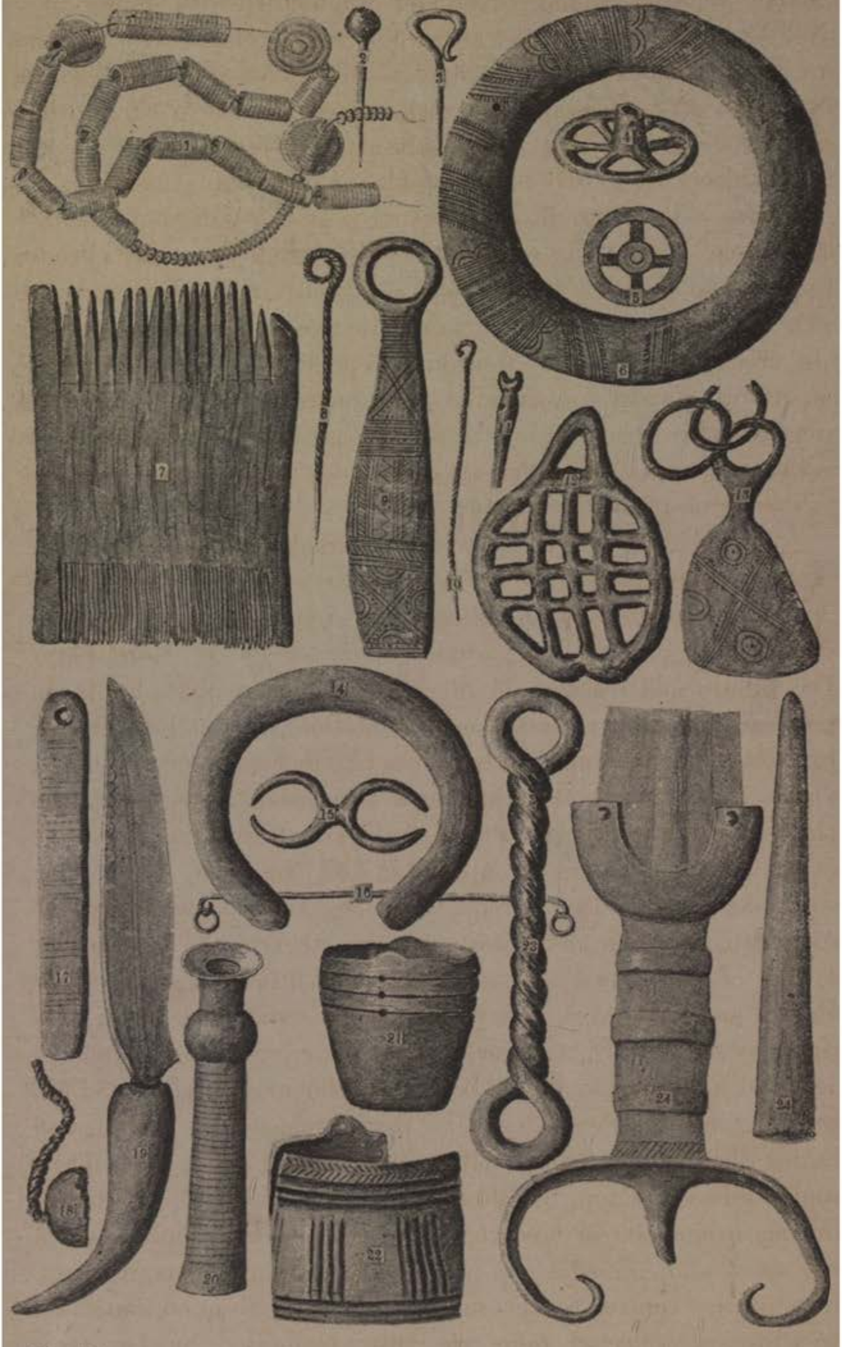
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Fig. 11.—Concise and Corcelettes (5, and 14 to 23) Nos. 21 and 22 = $\frac{1}{4}$, the rest = $\frac{1}{2}$ real size.

bands of bronze, forming tubes, and ornamented with hollow lines (No. 1). Some of these tubes are of gold, and interspersed with them are three buttons of bronze and a number of small blue beads. Two bracelets or closed rings, ornamented (No. 6); a ring with a prominence inside; and a curiously-wrought pendeloque (No. 12). These objects are mostly in the possession of private collectors.

ONENS.—Two stations are situated near the village of Onens—one (Stone Age) to the east of the village, and the other (Bronze Age) to the south. The former, now entirely on dry land, has been little explored, being for some time covered with vegetation. "Je crois," says M. de Meuron, "cependant qu'elle a dû être importante d'après son étendue et la quantité de cailloux éclatés que recouvrent le sol. Cette station appartient à moi; mais la végétation y est devenue si belle que je la laisse pour les générations futures." (B. 462, p. 47.)

On the bronze station several remarkable pendeloques in the form of thin discs of bronze were found some years ago, which are now deposited in the Museum at Neuchâtel; and since this discovery it has been partially explored by M. Morel-Fatio, Dr. Brière, and others. M. de Meuron states that he is in possession of a few objects from this station, viz. hatchets, chisels, bracelets, and a magnificent lance-head 10 inches in length. From Onens comes the leaden cake with suspension loops similar to those from Wollishofen (**Fig. 4,** No. 24). Illustrations of some of the bronze discs are given on **Fig. 189,** Nos. 1 to 3.

CORCELETTES.—Two groups of piles were observed by the early explorers, one to the east and the other to the west of the village of Corcelettes, and a number of antiquities both of the Bronze and Iron Ages were collected. The station, however, was never systematically examined till the lowering of the waters in 1876, when it was found to be one of the most prolific and interesting in Lake Neuchâtel. The portion since then investigated is described by Dr. Gross as lying immediately before the village, and 2 kilomètres from Grandson. It extended about 200 mètres in length and 100 in breadth. The relic-bed was thinly covered with sand, and varied much in thickness, from a maximum of 3 feet in the centre, to the margin where it thinned out. The bronze relics collected here are thus estimated by Dr. Gross at the twelfth meeting of the German Anthropological Society:—*

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* *Corr.-Blatt,* 1881.

60 hatchets, 4 hammers, 30 sickles, 60 to 70 knives, 10 swords (three of which are complete), 150 entire armillæ and many fragments, 20 lance-heads, 12 discs (phalères), 300 to 400 hair-pins, 3 vessels, 11 moulds (one of bronze and 10 of sandstone), besides a quantity of smaller objects, as buttons, pendants, rings, etc. Together with beads of glass and amber, small tin wheel-shaped objects, there were some 300 entire vessels of pottery, some ornamented with tin strips, crescents, etc.

The bronze hatchets were mostly of the usual type, *i.e.* with four wings and a side loop; four were socketed, but not one of the flat type.

Daggers were apparently rare at Corcelettes, as only one example was found, with rivet-marks and slightly ornamented on one side.

The knives were generally small, but one measured 10½ inches in length, and a few had solid handles beautifully ornamented. Razors were numerous; one was made of a broken bracelet, another was double-bladed and showed a break which had been neatly mended with bronze wire. Horse-bits were of bronze and horn. The bronze hollow armlets are beautifully ornamented, and in the interior of some of them were observed bits of wax, supposed to be the remains of a central core of this material which had been used in the operation of casting.

It is singular that among the many ornaments from this station there is not a fibula, except a portion of one which is claimed as an importation from Scandinavia (**Fig. 189,** No. 19).

Of wood there were:—A round oak table; a small box, 8 by 2½ inches; and a portion of an oar.

Of the three bronze dishes, one has a handle attached by rivets; and of the other two (which are in the Museum at Lausanne), one is of northern origin (**Fig. 189,** No. 20).

Corcelettes, like most of the other Swiss lake-dwellings, was destroyed by fire, in proof of which Dr. Gross points to a mass of bronze objects, in a half-molten condition, consisting of three hatchets, four bracelets, a lance-head, and a sickle. (Figured in B. 392, Pl. xxii. 12.)

One of the largest collections from Corcelettes is in the Museum at Lausanne, of which I have made the following jottings:—

Pottery.—The bottom of a vase marked with the tips of the potter's fingers; some dishes ornamented with herring-bone patterns (**Fig. 11,** No. 22), and others with circular grooves, each having a small perforation like one at Constance (No. 21); small toy cups, three of which are bilocular; clay rings, with dishes to fit them; two figures of animals; bits of clay-walling with marks of round timbers.

Wood.—Fragments of basket-work, two shaped handles of wood for sickles, fragments of wooden dishes (one with handle).

Bronze.—Of about 100 large hollow bracelets more or less perfect, some 50 are ornamented with transverse lines; the rest have various designs of lines and circles. A few bracelets are solid, and more or less penannular, with pointed or expanded tips. Four bracelets are of double wires, one of which is spirally grooved and ends in a hook and eye. Of six small socketed hammers, three have side loops, and all are more or less rectangularly shaped. Among 60 hatchets, only six have sockets, and nearly all have side loops, but no terminal catch. Two have the side loop transverse to the cutting edge.

Of 78 knives, nine are socketed, three have solid handles, apparently as part of the blade, and the rest have tangs (three being bent into a loop at the top).

Among some hundreds of pins, only seven or eight have perforated heads.

Of three horse-bits, one is entire (**Fig. 191,** No. 8); and of the others, only the twisted central portion remains (**Fig. 11,** No. 23). Moreover, there are 14 perforated portions of horn, supposed to have been parts of bridles.

Among the special objects from this station is a slender bronze rod terminating at each end with a movable ring, somewhat like the beam of a balance (No. 16). In the Museum at Boudry there is a curious ornamental tube of bronze (No. 20).

In 1888 Dr. Brière communicated a short note to *Antiqua* (B. 463a), in which he enumerates the following objects as the most interesting among recent finds:—A bracelet of lignite (No. 14), a tin wheel (No. 5), an amulet of bronze like the casing of a pair of spectacles (No. 15), a large bronze knife with a horn handle (No. 19), an amulet of staghorn (No. 17), a bead of amber suspended by a twisted bronze wire (No. 18), and a complete bridle-bit of horn (**Fig. 191,** No. 1).

LES UTTINS (YVERDON).—At the foot of Mount Chamblon, rather more than a mile from the lake, there are some peat deposits, which the peasants have been in the habit of utilising as fuel. Here in two spots, according to Mr. Rochat,[*] the peat-cutters are reported to have met with piles and transverse beams with mortices. The tops of the piles were 6 to 10 feet below the surface. A flint arrow-head, two stone celts of serpentine, and a bronze bracelet, were found in one of these bogs; and hence Messrs. Troyon and Rochat (B. 31, p. 70) consider that there was a palafitte here—a supposition which involves the theory that the lake formerly extended to the locality. Nor is this theory without some evidence in support of it, as the amount of *débris* brought down by the Thielle is very great. On the supposition that the Roman city of Eburodunum, the ruins of which are now 2,500 feet from the present shore, was built on the lake in the fourth century, Mr. Troyon calculates that the water of the lake would have been as far back as the site of the palafitte about fifteen centuries before the Christian era.

CLENDY, CHESEAUX, AND CHABLE À PERRON.—Along this part of the shore there were three or four settlements with steinbergs, but the piles are now destroyed, and the few antiquities collected belong apparently to the Stone Age. Chable à Perron covers an area of some 3,500 square yards, but the only antiquities found were serpentine hatchets and their horn fixings, some flints, pointed bones, and fragments of coarse pottery. (B. 336.)

Some interesting notes of the early researches and discoveries made on the various stations in the vicinity of Yverdon are given by Mr. Rochat in Keller's third report on the Pfahlbauten. (B. 34.)

FONT.—On this station a cup-marked stone was found, and Troyon records several objects—a curious bronze needle, Roman tiles, and Imperial Roman money—as coming from the same place. Professor Grangier, of Fribourg,[†] found here some Roman medals, together with an iron arrow-head, iron keys, and subsequently an oar.[‡] He states that the whole coast, from Font to Estavayer, was occupied with piles, and that he attempted to make a plan of the stations, but gave it up, because the configuration was constantly changing. The original conditions were also entirely altered by the number of piles extracted by the fishermen. He knew one family who for two generations had never used any other firewood but piles extracted from the lake-dwelling stations. One place, about half-way between Font and Estavayer, was well known for its antiquities, and went among the fishermen under the name of "La Pianta." (B. 178, p. 169.) In the Fribourg Museum there is a considerable number of bronze objects from Pianta, some of which are here figured (**Fig. 12**, Nos. 1 to 10, and 24). I have also noted three stone moulds (two of wheel pendants), and an ingot of bronze. Some pins and a knife are in the Bern Museum.

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[*] "Recherches sur les Antiquités d'Yverdon," *Mitt. der Antiq. Gesel.*, Zürich, vol. xiv.

[†] *Anzeiger*, 1871, p. 280.

[‡] *Ibid.*, 1878, p. 803.

Mr. Forrer gives some notes of the station at Font,* and figures some nephrite implements from "several hundreds" collected here by Mr. Beck. Along with the usual chisels and hatchets, there are in Mr. Beck's collection arrow-heads, knives, etc.—objects rather rare of this material in the Lake of Neuchâtel. Some of the hatchets are remarkable for their size, one measuring 8½ inches long, and others show great variety of colours.

ESTAVAYER.—Mr. A. Morlot describes the early investigations of the settlements at Estavayer and its neighbouring shore in Keller's third report. (B. 34.) Systematic explorations were conducted by MM. Béat de Vevey and Henri Rey, who collected a large and varied assortment of relics, especially of bronze, many of which are illustrated on Pl. v. Close to Estavayer there were two stations—one of the Stone Age; and another, farther out in the lake, of the Bronze Age. The former was parallel to the shore, about 120 yards long and 60 broad. The relics here found were of the usual Stone Age types—stone and horn hatchets, flint saws, and arrow-points, etc. One finely-finished hammer-axe has an oval perforation, an expanded cutting edge, and a raised bead running along the centre of its anterior surface.

The Bronze Age settlement was some 400 feet distant from the shore, in water six or seven feet deep. Consequently the station is now, during low water, mostly on dry land. The area of the station was estimated at 7,700 square feet. The following is a list of the bronze objects collected by MM. de Vevey and Rey, chiefly by means of pincers:—128 hair-pins (36 with spherical and ornamental heads), 26 knives, 15 bracelets, 5 sickles, 1 socketed hatchet, 1 chisel, 1 fish-hook, 27 rings of different kinds, 2 buttons, 1 dagger-blade, 1 arrow-head (socketed), and 6 flattened wires coiled in the form of a spiral.

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* *Antiqua*, 1885, p. 162.

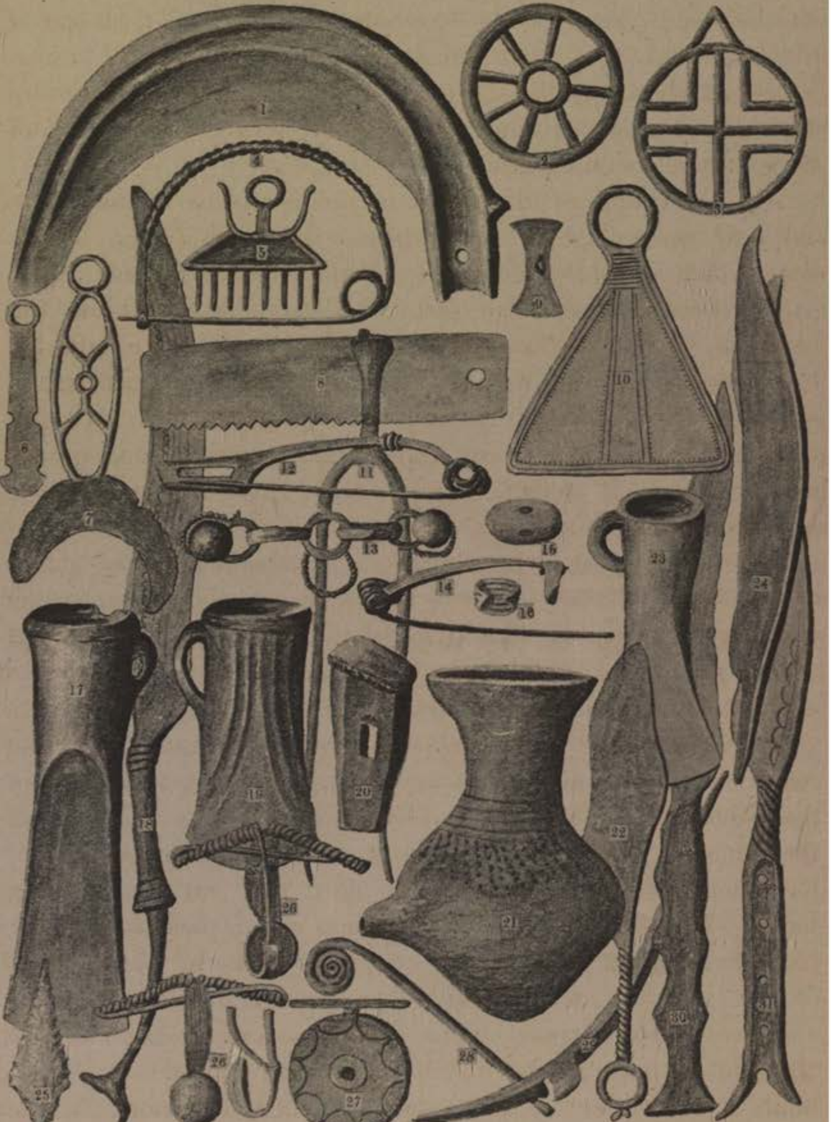
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Fig. 12.—Estavayer. All $\frac{1}{2}$ real size.

In 1869 Dr. Keller (B. 163) gives an account of further discoveries at Estavayer, in which he mentions a small vessel of fine clay, having a funnel-like opening and a spout below

(**Fig. 12,** No. 21); a hair-pin 5½ inches long, with the stem of bronze, and head of staghorn, intercepted in the middle with a disc of silver; a bronze spear-head, with a spur on the stem, supposed to have been used as a spear for fishing; a bronze bracelet; and two tynes of staghorn—one perforated as for a bridle-bit, and the other ornamented with concentric circles. Professor Grangier, writing in 1878 (B. 313), describes the *tenevière* of Estavayer as a peninsula, and gives an amusing description of the searchers for antiquities.

About a couple of kilometres to the north-east of Estavayer, and near the village of La Corbière, there was a large settlement which also belonged partly to the Stone Age and partly to the Bronze Age. The first is a steinberg, and bears the name La Creuse or La Crasaz. (B. 414c.) On it, in addition to the ordinary Stone Age objects, were found a Roman water-jug and a fibula of the La Tène type (**Fig. 12,** No. 26). The part that has yielded bronze implements is farther out in the lake, and from it Colonel Schwab and others collected a considerable number of objects, among which were:—A bar of tin 6 inches long, a small bronze saw, a socketed arrow-head, a thin armlet of bronze wire, a bronze nail, a discoidal stone, fragments of pottery ornamented with strips of tin, etc. Near this in 1875 Professor Grangier discovered a curious object now supposed to be the handle portion of an Etruscan chariot. (B. 270 and 336.)

There are thus three well-defined Bronze stations in the vicinity of Estavayer, besides an equal if not larger number of the Stone Age. The chief collection of relics from this part of the lake of Neuchâtel is in the Museum of Fribourg, where I have noted:—A double-legged pin (No. 11), portion of chariot handle (**Fig. 191,** No. 10), a small bronze cup, a perforated bronze hammer (**Fig. 12,** No. 20), a couple of socketed bronze axes (Nos. 17 and 19), and a well-made arrow-point of flint (No. 25).

There are also many objects from Estavayer in the Cantonal Museum at Bern, among which may be mentioned:—A bronze fibula (No. 12), part of an ornamental chain of various sorts of bronze links (No. 13), a socketed axe (No. 23), and three large knives (Nos. 18, 30, and 31). The other illustrations are a bronze pin with a spiral head (No. 28), a gold earring (No. 16), an amber bead (No. 15), a bronze knife (No. 22), a bronze fibula (No. 14), a pin with a flat head (No. 27), and a curious horn object (No. 29).

Implements like the latter are frequently met with in Swiss lacustrine stations. They vary from a few inches up to twelve or more in length, and are always curved and polished. In the Bern Museum there are four from Gerlafingen, five from Schaffis, and others from Sutz, Locras, etc.

FOREL.—Little was done to this station till 1883, when the Fribourg Government granted free permission to the searchers for lacustrine antiquities to collect on their portion of the shore of Lake Neuchâtel. Since then many curious objects are reported as coming from this station, but they are mostly held by private collectors. Mr. A. Vouga gives some notes of these discoveries in the *Anzeiger*. (B. 414.) He states that the relics are found on this station in three different strata, the most superficial of which is 1 foot 6 inches deep, and the lowest 4 feet 8 inches.

Among the objects described and figured by Vouga are:—A stone hatchet in its horn fixture, several hatchets of coloured nephrite and one of green jade, perforated hammers and a cup of horn; knives, pins, etc., of bone; a curved implement made of the jawbone of a stag (**Fig. 13**, No. 19). Some remarkable objects made of horn or bone and ornamented with dots, circles, etc., consisting of bracelets (No. 20), and pendeloques (Nos. 13, 17, and 18), have attracted the attention of critics, and the general opinion is that they are forgeries.*

CHEVROUX.—Troyon describes three large settlements of the Bronze Age (B. 31, p. 150), near Chevroux, farther from the shore than a Stone Age settlement, on which were found bracelets, hair-pins, sickles, knives, two swords of bronze, and a great iron fork (**Fig. 13**, No. 15). In 1866, an object (**Fig. 191**, No. 10), described by Keller as part of an Etruscan chariot, was found near this. (B. 337.)

In the Museum at Lausanne there is a large collection of objects, both of the Stone and Bronze Age settlements, from Chevroux. Among the former are:—Two beautiful flint daggers with thin handles of wood (**Fig. 13**, No. 1), six saws of flint in their handles, part of a wooden comb, three wooden dishes, the club handle of a stone hatchet with the implement still in position, bone pins with neatly-fashioned heads (Nos. 4 and 6), etc. There are over 300 plain stone celts, and 30 perforated tools. About 100 horn fixings, of which one-third have bifurcated tops. Some celts have been identified as belonging to the following substances:—chloromelanite five, three of which are in their horn fixings (two bifurcated); saussurite, 14 to 20, one of which is in its

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* *Antiqua*, 1885, p. 97; and 1887, pp. 35, 51.

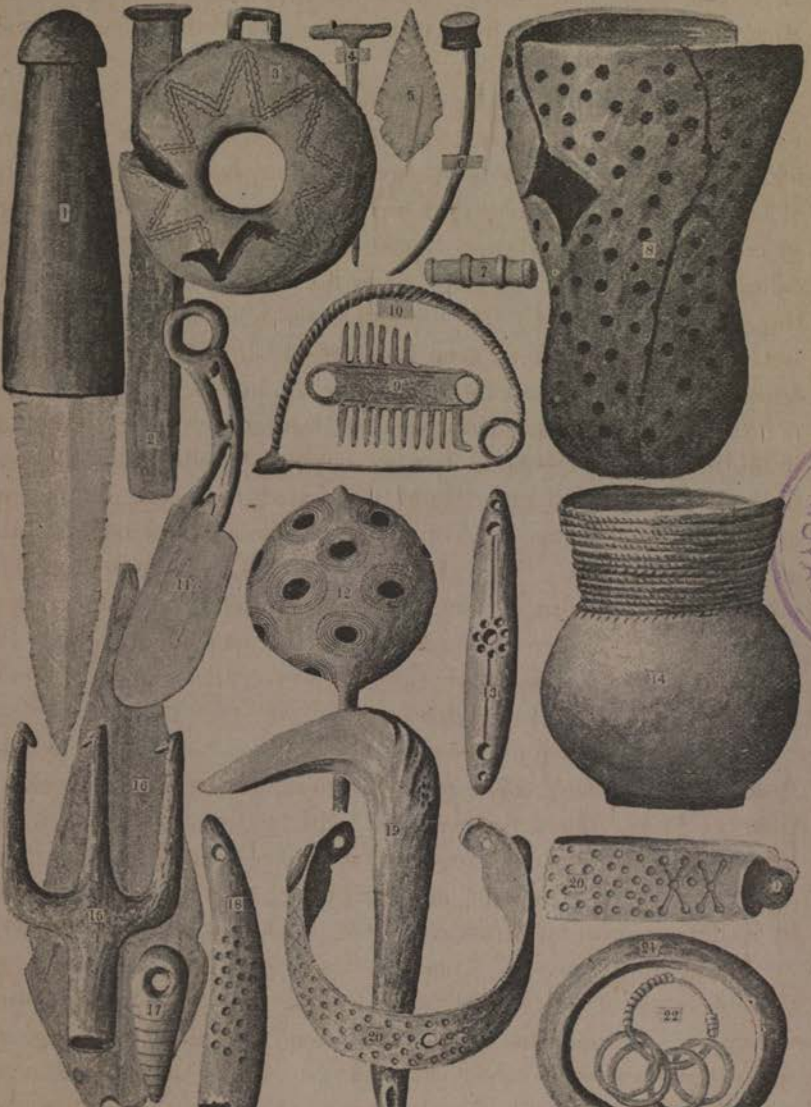

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Fig. 13.—Chevroux, Forel (13, and 17 to 20), and Portalban (21 and 22). All ½ real size (except No. 15 ¼).

handle (square); jadeite 22 to 25, five in handles (two bifurcated); nephrite 23 to 26, two in their fixings. There are also a few of felsite, amphibolite, etc. About 100 flint arrow-points, and the same number of beautifully chipped flint arrow-heads (No. 5). Also of horn there is a large number of chisels, pointers, hammers, flax-hecklers, and some curiously-shaped perforated clubs of horn.

Among the pottery are some curious dishes, two of which are here figured (Nos. 8 and 14), the latter being adorned with string ornamentation.

Among the objects from the Bronze Age stations are:—Many hair-pins, two phalères, five sickles, a few bracelets, one winged and one flat hatchet, portion of a flat copper celt, a few knives with tangs, six small daggers, and two remarkable pendeloques, one of which is here figured (No. 3).

Mr. Vouga (B. 414d) describes some fine discoveries that were latterly made on the Bronze stations. Among the objects which have come under his notice are:—A razor with a curved handle, 4½ inches long (No. 11); a thick crescent, ornamented with half-moons; a fibula (No. 10); a pin with spiral stem (9½ inches long) and perforated head (1⅛ inch in diameter). Another has a very large head (2 inches diameter), with 24 holes in it (No. 12). Other objects from this station are a comb (No. 9), an amber bead (No. 7), a copper dagger (No. 16), and a copper chisel (No. 2).

GLETTERENS TO LA SAUGE.—Some eight or nine stations have been noted by the earlier explorers along this part of the coast, many of which have yielded Roman tiles and pottery. At Port Alban there are the remains of a station on which bronze (No. 21) and iron objects have been found. Recently there has been brought into notice a kind of ornamental metal mirror, said to have been found here (**Fig. 192**).*

Another site is farther east, giving indications of an early Stone Age station, but on which Desor found iron objects. Among recent finds are some large horn buttons and a so-called "portemonnaie lacustre" (No. 22).†

At Champ Martin there is a steinberg, on which spindle-whorls and a few other things have been found.

At Cudrefin the lake-dwellings are unimportant, but the station is well known as the site of a canoe, carefully described by Professor Grangier. It measures 36½ feet long, 2 feet 9 inches broad, and 1 foot 6 inches deep. This dug-out, like so many in

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* *Zeitschrift für Ethn.*. vol. xvi., *Verhand.*, p. 84; *Antiqua*, 1884, p. 167.

† *Antiqua*, 1886, pp. 12 and 21.

Ireland and Scotland, had for strengthening purposes four transverse beams left in the solid. The prow had a perforated beak, which might have been used as a means for fastening a rope. (B. 194.)

At La Sauge fragments of Roman amphoræ and tiles were found associated with some piles.

LAKE OF MORAT (MURTEN).

Lying directly between the lakes of Neuchâtel and Morat there stretches a considerable elevation called Mount Vully, which ends abruptly at its north-west end on the margin of the Gross Moos. At the base of this declivity lies the Broye, and as the widening and deepening of its channel was part of the great scheme for the Correction des Eaux du Jura, a similar effect was produced on Lake Morat as on the lakes of Bienne and Neuchâtel. Previous to the lowering of its waters, however, the lake-dwelling stations along its shores were carefully examined by Colonel Schwab, Baron von Bonstetten, and the Count de Pourtalès, the proprietor of an estate on its western shore.

In Keller's 5th report (B. 61) the number of stations in this lake was given as 16, and since then one or two more have been added to the list. Many of these were, however, mere indications which, on the lowering of the level of the water, have turned out to be only stone cairns supposed to have been landing-places. According to the most recent researches of Mr. Süsstrunk (B. 336 and 462), the number may be reduced to 11, the positions of which are sufficiently defined on the accompanying Sketch Map. They belonged mostly to the Stone Age period, and only three, viz. Montilier, Greng-Insel, and Vallamand survived during the most flourishing period of the Bronze Age.

Montilier.—The first station of importance, beginning on the east side of the lake, was situated a little to the north of the present village of Montilier. It contained a steinberg, and the piles were stout and firmly fixed. Here Colonel Schwab found not only objects of the Stone Period, such as flint knives, stone hatchets, etc., but also an unusually large number of handsome earthenware vessels presenting a style of ornamentation which at once led him to assign the settlement to the Bronze Age—a deduction which his subsequent discoveries completely justified. These vessels were neatly finished, and had their surface sometimes rubbed over with charcoal or graphite, a process which gave them a glossy appearance. They were made without the intervention of the wheel, and from not giving out a ringing sound when struck with a hard substance, Colonel Schwab concluded they had been burnt in open fires. The ornamentation consisted of deeply incised lines, circles, triangles, etc., filled with a white chalky substance. In some instances strips of tin were plastered over the surface, which took the place of the linear incisions, and so presented a pleasing combination of the same principles of ornamentation. The forms of the vessels are extremely elegant and varied, and may be classed as *cups*, *bowls*, *plates*, *jars*, and *jugs*. Some have handles, others spouts springing from the middle of the bulge, and others a series of symmetrical perforations, but whether for ornament or use it is difficult to decide. One most remarkable dish like a saucer has its inner surface ornamented with linear incisions and a series of thirty symmetrically disposed groups of perforations. The colour of this pottery was either black, red, or grey, and sometimes the same dish had a combination of these colours. Spindle-whorls of diversified forms, and ornamented with dots, oval depressions, etc., were also abundant. (B. 126, Pl. iv. and v.)

Among the other Bronze Age antiquities collected here were some stone moulds, hair-pins, hatchets, knives, armlets, rings, sickles, fish-hooks, beads of glass and amber, a small flat finger-ring of gold, etc. There was also portion of an armlet of tin. The bronze knives were not numerous, but one was highly ornamented with a series of three flowing patterns of semicircles separated by incised lines which ran along its curved back.

No swords or bronze dishes are recorded from this station; and of three bronze hatchets in the Murten Museum, of the usual winged type, one has the loop transverse to the cutting edge, and a portion of its wooden handle still remains between the wings.

MURTEN.—This station lies a little above the monument of the battle of Murten. It is of considerable size, and has yielded a large quantity of Stone Age objects, such as large perforated stone axes, staghorn hammers, flint arrow-heads, lumps of carbonised wheat and many other seeds, weaving-weights, and also bits of burnt cloth. The station is now completely worked out. (B. 61 and 462.)

MEYRIEZ (MERLACH).—This station belongs to the early Stone period, and no perforated axes are among its relics. Among the few things collected on its site the following may be mentioned:—Bits of cloth, burnt corn, stone hatchet in wooden handle, another hatchet of jade, etc. The woodwork was very rotten, and the piles could hardly be distinguished. A canoe with ribbed floor (now in the Fribourg Museum) was found in the vicinity of the station. (B. 462.)

GRENG-INSEL.—This settlement was situated at the end of a low tongue of land which projected into the lake, and covered an area of 49,000 square feet. Near the shore the relics were entirely of the Stone Age, but farther out in the lake they became mixed with bronze and even iron objects. During low water, previous to the Correction des Eaux du Jura, a considerable portion of this station could be visited on dry land, but now it is entirely dry. In its vicinity are several stone cairns which have greatly puzzled antiquaries, as no relics have been found on them. Piles were observed in two of them—one lying to the north-east and the other to the south-west of it.

When this station was first investigated (1861–2), it yielded a number of perforated hammers and hatchets (some showing unfinished perforations), six flint knives, corn-crushers, a stone mortar, a bronze ring, a hair-pin, and several implements of iron. (B. 61.)

Subsequently the proprietor, Count de Pourtalès, with the co-operation of the local archæologists, made further excavations, which proved that it essentially belonged to the Stone Age. From Dr. Uhlmann's Report (1865), it appears that the relic-bed was from 1 to 4 feet below gravel and matted roots. The piles were generally of oak-stems as thick as a man's arm or leg, and some were as much as 1 foot in diameter, but when they reached this size they were generally split. They were irregularly set, and penetrated deeply into the mud below. They were of a blackish colour, well preserved, and apparently pointed with stone axes. Among the relics collected were daggers, saws, and arrow-heads of flint, beautifully made (**Fig. 14**, No. 9); stone celts, neatly bored; implements of bone, as chisels, pointers, etc., and staghorn haftings.

Fragments of pottery showed two qualities—a reddish thick earthenware, badly burnt, and a finer quality with some linear ornamentation.

The bones turned up were very numerous; among which Dr. Uhlmann recognised those of the following animals:—Urus (a large variety of horned cattle) and the small *marsh cow.* The sheep-bones indicated a large race with strong horn cores bent backwards and outwards; but those of the goat belonged to a more slender animal; stag, elk, and roe-deer. Amongst the carnivora were the great bear, the teeth of which were perforated for suspension, the dog (larger than at Moosseedorf), fox, hedgehog, and beaver. Bones of the frog, and the scales and bones of a fish, probably a species of pike. Also there were several portions of skulls and other human bones.

Among vegetal remains were hazel and beech nuts, stones of the sloe and birdcherry; seeds of raspberries, blackberries, and strawberries; and carbonised masses of wheat. (B. 126.)

When the station became dry in 1874, in consequence of the drainage-works, it was again investigated by Mr. Süsstrunk, on behalf of the town of Morat and the Canton of Fribourg. Among the objects then found were two flat celts, the composition of which, according to Dr. v. Fellenberg's analysis, was a mixture of carbonate of copper and sulphur, without any traces of tin. Among other things were buttons and haftings of staghorn; a conical stone set in a long hafting of staghorn; some netting-needles of wood, etc. (B. 286.)

Since then a considerable number of the usual class of bronze objects as hatchets, knives, hair-pins, fish-hooks, rings, etc., have been found on this station. (B. 462.) Noteworthy is a knife, partly of bronze and partly of iron (**Fig. 14,** No. 1).

Among the objects in the Museum at Morat are clay weights, dishes of pottery (Nos. 13 and 15), staghorn haftings (some with a slit at their handle-end); a curious object of staghorn, like a large earring (No. 17); beautifully worked flint daggers (No. 9), and a large number of bone chisels, pointers, etc. In the Museum at Bern there is a mould for a flat celt, with the casting still in its case, like one in the Museum at Stuttgart from the Ueberlingersee.

GRENG-MÜHLE.—The next station following in the same direction is a large and prolific station of the Stone Age, with staghorn implements predominating among its relics. The perforated stone axes are wanting. (B. 462.)

FAOUG (PFAUEN).—Near the railway station, in the course of digging a well, the relic-bed of a pile-dwelling belonging to the Stone Age was encountered, but its contents have not yet been excavated. A little to the west of this in the lake some bronze objects were found associated with piles, but these relics are supposed to have come from Vallamand. (B. 462.)

Near Faoug there was observed a curious wooden structure, which Dr. Keller suggested might have been a circular lake-dwelling, like the Irish crannogs. Mr. Süsstrunk wrote a short notice of it (B. 336), in which he comes to the conclusion that it was more likely to be in connection with fishing than with the Pfahlbauten. It consisted of seven concentric circles of slender piles, separated by an interval of from 2 to 3 feet. The diameter of the largest circle was hardly 14 yards, so that little space was left in the interior for any supposed dwelling. The outer circle was formed of boards, about 10 inches broad and 2 inches thick, standing on end, and penetrating the soil to the depth of 3 feet or so, and so closely set as to be almost touching. The piles in the other circles were round and small, and their ends penetrated only 18 inches into the earth.

VALLAMAND.—This station was extremely rich in Bronze Age objects, and was known to Colonel Schwab, who found many vessels, clay rings, discoidal stones, a bronze earring, and a bronze shallow plate, about 10 inches in diameter and 1 inch deep. One of the fictile dishes (No. 16) is shaped like a water-bottle, and has its neck perforated with a number of small holes arranged at uniform distances and so as to be in perpendicular line. From each hole a circular line runs round the neck. (B. 61, p. 49.)

The station was finally explored in the interests of the Museum of Lausanne, where there is now a splendid collection of its relics. Some things, however, have gone to the Museum at Bern and to that in the castle ruins at Avenches. One of the most interesting objects from this station is a razor in its wooden case (No. 8). In the Lausanne Museum the objects are marked Guévaux, and among them are the following:—Of bronze—four winged celts with side loops (two of which have a terminal catch), three large hollow rings with linear ornamentations, one bracelet, two cups ornamented with small repoussé prominences, six sickles (two with a back spur and one with an upright spur), a large cup-shaped head of a pin like the one from Wollishofen

(**Fig. 3**, No. 9) several pendants (**Fig. 14**, No. 10), involved rings (Nos. 2 and 4), gouges, buttons (No. 7), studs, 1,300 rings found together, combs (Nos. 11 and 12), and a curious rod hooked at

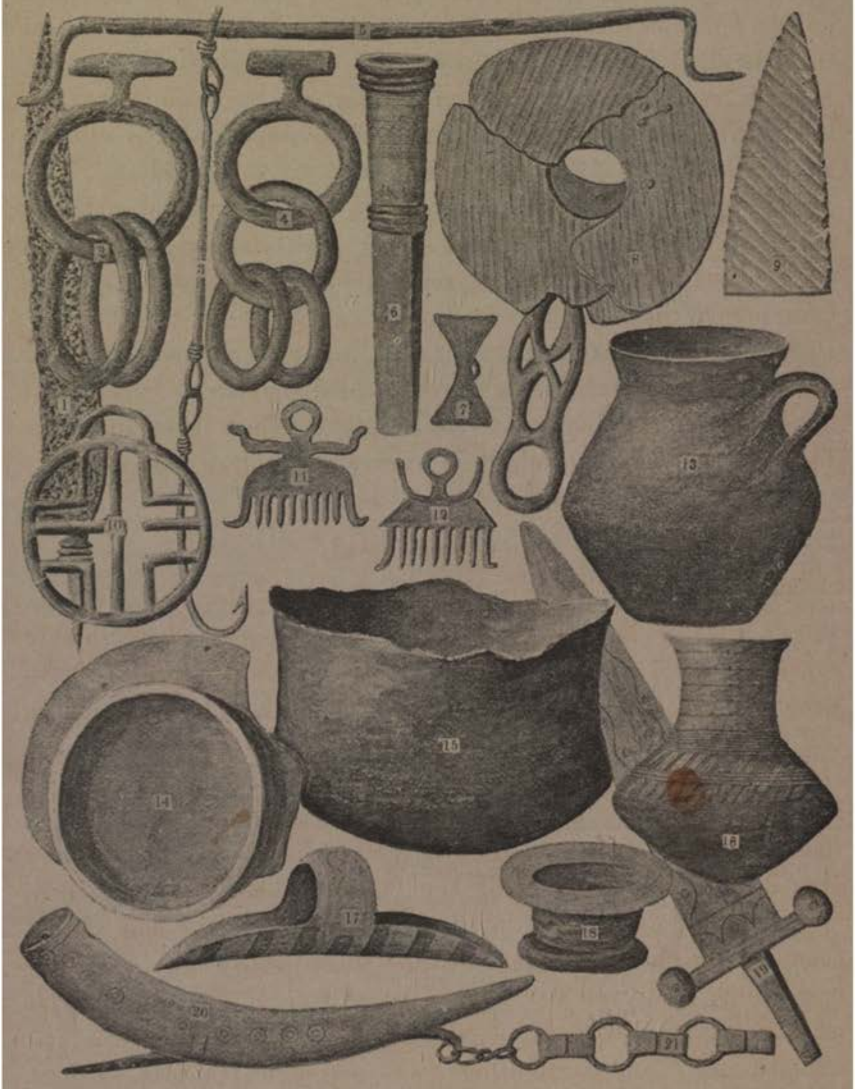

Fig. 14.—Vallamand and Greng-Insel (1, 9, 13, 15, and 17). Pottery = $\frac{1}{4}$, the rest = $\frac{1}{2}$ real size.

the ends and perforated (No. 5). A fish-hook with attachments (No. 3), a pin with attached chain (only a portion of which is here represented, No. 21), and a curious ornamented dagger, are from other collections.

A few specimens of pottery (Nos. 14 and 18) and an ornamented horn (No. 20) complete the illustrations from this station.

GUÉVAUX, ETC.—The four stations on this part of the coast—viz. Guévaux, Mür, Motier, and Sugiez-Zollhaus—have furnished only a few traces of their existence, from which it would appear that they belonged to the pure Stone Age.

The group of well-preserved piles at the mouth of the Chandon was probably a Roman landing-stage, as Roman tiles have been found along with them.

At Nant were found two kettles, one of bronze and the other of copper with an iron ring, two daggers, some iron arrow-heads, and a piece of sculptured marble, evidently of a later period than the lake-dwellings.

Of the remaining eight or nine cairns whose tops were occasionally above water, none have yielded industrial relics, and there is consequently no evidence as to their age and use. They are too small to admit of even a single hut. (B. 462.)

INKWYLERSEE.

The little lake of Inkwyl is surrounded by low pasture-land, and in the middle of it there is a small circular island thickly wooded, which in appearance suggests the idea of a Scottish Crannog. Professor von Morlot first, in 1854, drew attention to the probability of the island being artificially constructed, and a short notice to this effect, which appeared in 1857 (B. 19), induced Mr. Amiet, of Soleure, to make some excavations. In the following year (1858) these explorations were continued by Mr. Roth, the proprietor of the island. The result of their operations* showed that there was originally on the site of this island a pile-dwelling; which became subsequently a solid island, now rising about ten feet above the surface of the water. The island measured 90 feet by 80 feet, and in the interior of it, some 6 or 7 feet deep, there was a rough platform of logs supported on piles. The antiquities, collected immediately on and underneath the platform, consisted of stone axes of nephrite and serpentine, along with their staghorn haftings; corn-crushers; flint arrow-heads; bone implements; perforated tusks; fragments of pottery, both rough and fine; clay rings and weights;

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* *Anzeiger*, 1858, p. 57; "Supplément au Recueil d'Antiquités Suisses, 1860."

spindle-whorls; broken bones of various animals, such as stag, roe, marsh pig, wild boar, ox, beaver, and some birds. (B. 22.)

In the superficial layers were found a bronze spoon, fragments of Roman pottery and flanged roofing tiles, an iron lance-head, and a spur, apparently relics of the Middle Ages.

BURGÄSCHISEE.

About half an hour's walk from Inkwyl there is a somewhat extensive valley, in which lies the small Burgäschisee, whose boggy margins were for some time surmised to contain the remains of lake-dwellings, as several objects of stone and a couple of bronze pins were found by peat-cutters. A few years ago the matter was put beyond doubt by investigations conducted under the superintendence of Dr. Uhlmann and Mr. Jenner. A series of pits were dug in the peat along the shore of the lake, and at a depth of 2 to 4½ feet they came upon very rotten piles, and a large assortment of the usual industrial remains of the lake-dwellers of the Stone Age. The relics and osseous remains were similar to those from Moosseedorfsee; and among the former were stone axes, flint saws, scrapers and daggers, arrow-points, of flint and of rock crystal, with traces of asphalt, and mealing-stones. Also fragments of various vessels, one with a handle; implements of bone and horn, as chisels, pointers, etc.; a rubbing instrument, made of the underjaw of a beaver; forked implements of ribs, etc.

Noteworthy is the fact that some stone relics show evidence of having been sawn. A short notice of these discoveries is inserted in the eighth report on the Pfahlbauten by Mr. Keiser, of Burgdorf. (B. 336.)

MOOSSEEDORFSEE.

This settlement, known as Moosseedorf, was situated in the marsh of Münchenbuchsee, about seven miles from Bern. The small lake of this name is now nothing more than a moorland tarn, surrounded by meadow-land and peat bogs. It is of an oblong form, having its greatest axis (east to west) corresponding with that of the valley. During the winter of 1855–6, in consequence of a canal made for agricultural purposes, its usual level was lowered some eight feet, and thus a considerable portion of its peaty bed became exposed, and for the first time divulged the existence of two pre-historic pile dwellings, one at each end of the lake. The western, which was more satisfactorily investigated, owing to its site becoming dry land, proved to be a small parallelogram 70 by 55 feet. This area was occupied with piles of entire or split stems of oak and other woods, and leading from it and running to the shore, there was a kind of faggot roadway of branches. The relics were found among the piles and underneath a stratum of mud, containing the roots of reeds and water-plants. This relic-bed varied in thickness from 5 inches to 2 feet, and contained stones, gravel, bones, charcoal, etc., lying immediately over the shell-marl. The piles penetrated into this shell-marl, but no relics were found in it. During the succeeding ten years after its discovery, these settlements and their industrial remains were carefully examined by Messrs. Jahn, Morlot, and Dr. Uhlmann. (B. 19, 22, 34, 40, 126.)

The relics, most of which are deposited in the Bern Museum, include a large assortment of industrial remains:—40 stone celts (four of which are of nephrite), a number of stones perforated, and one stone spindle-whorl; flint saws in handles; arrow-points of bone, flint (one with barbs), and rock crystal; harpoons; horn fastenings for celts, some with a bifurcated end; three horn cups, all with a round hole at the edge; needles, gouges, chisels, and pointers of bone; a comb made of yew, a fish-hook made of boar's tusk, a skate from the leg-bone of the horse, pieces of cloth and string, bits of wood perforated as for net-floats, rolls of birch-bark, etc.

Fragments of pottery had perforated knobs for suspension, and some of them indicated large vessels—about 16 or 17 inches in diameter. In 1868 Dr. Uhlmann found a fragment of pottery having a perforated knob, and alongside of it, evidently for ornamentation, there were triangular bits of birch-bark plastered over the surface with asphalt. (B. 336, p. 37.) (**Fig. 184**, No. 5.)

Two portions of stone sawn off show that the art of sawing this material was then known.

According to Dr. Uhlmann's analysis of its flora and fauna the following species were identified:—

Flora.—Barley, wheat (*Trit. vulg.* and *compactum*), pea, poppy, and flax (*L. angust.*); also the water-chestnut (*Trapa natans*).

Fauna.—Among domestic animals were the dog, sheep, and various kinds of ox. A few bones of the horse were also found among the osseous remains, but as it is not yet certain that the horse was domesticated in the Stone Age, these might belong to the wild species.

The remains of wild animals showed:—Bear, badger, polecat, marten, wild cat, otter, fox, hedgehog, beaver, hare, squirrel, field-mouse, marsh pig, wild boar, elk, stag, roe, ox (*Bos prim.*), bison, several kinds of falcons, owl, wild pigeon, crow, partridge, heron, stork, sea-gull, wild duck, and teal; also those of the tortoise, frog, toad, perch, carp, pike, and salmon. (B. 284.)

SEMPACHERSEE.

In 1806 this lake was lowered to the extent of 6 or 8 feet, and on the shore thus exposed a number of piles became visible, among which it was reported that there were Celtic weapons, hair-pins, and other implements found. "Keltische Waffen, die in vii Bande des Geschichtsfreundes beschreiben sind, Nadeln und andere Gegenstände." (B. 15, p. 99.) But these notices and relics of a past civilisation attracted little attention at the time, and it was only in the light of Keller's discovery of lake-dwellings that the recollection of the find at Sempach was revived and properly interpreted. Colonel Schwab in his lacustrine peregrinations extended his researches also to Lake Sempach, and identified seven or eight stations along its shores, most of which were then on dry land. These settlements were situated near the following places:—Eich, Schenken, Inselchen, Mariazell, Margarethen, and Nottwyl; and in all of them some antiquities either of stone or bronze were collected. (B. 61.)

At the north end, near the site of the lake-dwelling at Mariazell, but about 20 feet from the water and a foot underground, there was a remarkable bronze hoard found. (B. 126.) At a short distance from this there was a human skull disinterred, and along with it a hair-pin and a bronze gouge; but whether or not these objects belonged to the lake-dwellers it is impossible to say. Most of the lake-dwelling remains from the Sempachersee are deposited in the Museum of Lucerne, among which I have noted the following:—One or two discoidal stones; a few clay cylinders with everted edges; whorls of various forms and sizes, some ornamented with lines and pitted impressions; pottery ornamented with lines and triangles, finger-marks, etc.; and four beautifully-worked stone axes (**Fig. 15**, Nos. 8, 9, and 10). The bronze find from

Maria Zellermoos includes seven winged and two flat celts, a chisel, two knives, one dagger with six rivets, four sickles (one

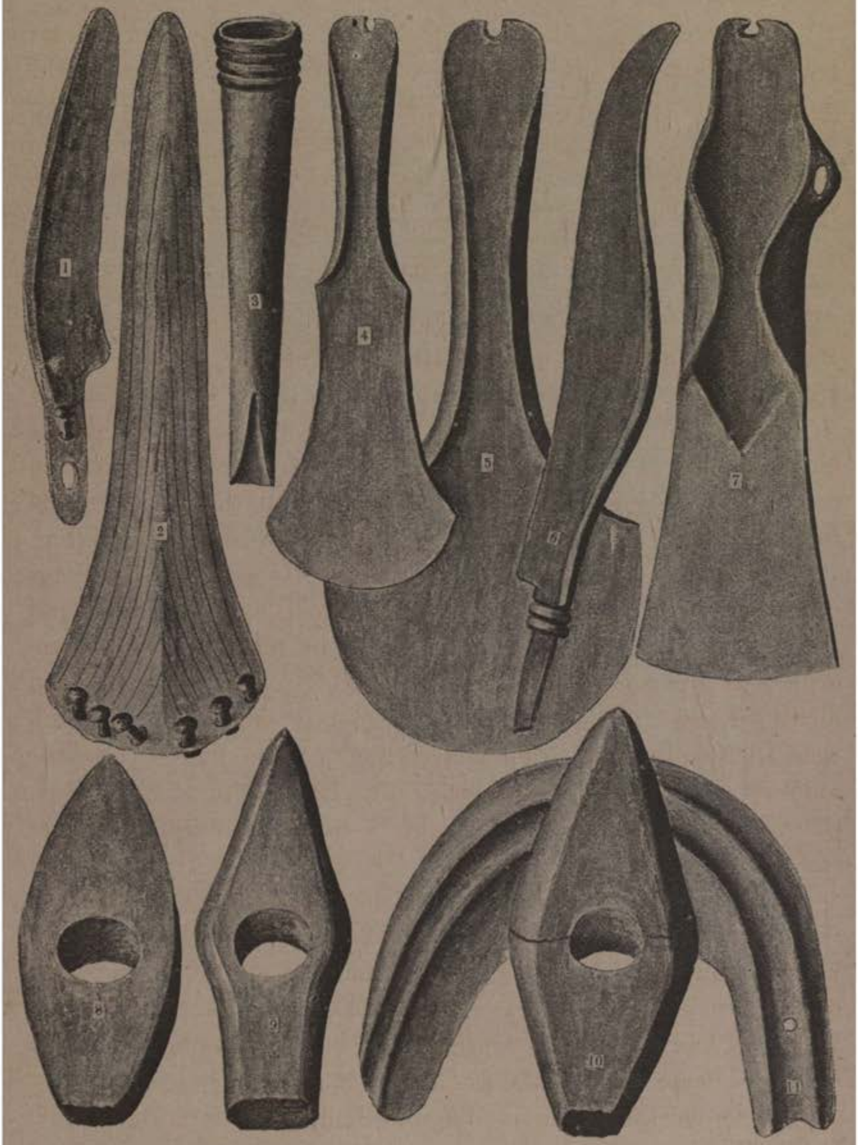

Fig. 15.—Sempachersee. All ½ real size.

with back spur), and 13 flat bracelets. Some Roman keys, buckles, a few yellow beads of glass (one of amber), etc., are mixed with this find. Specimens of these bronze implements are given on **Fig. 15,** Nos. 1 to 7, and 11.

WAUWYLERSEE. (B. 34 and 126.)

To the west of the little Lake of Wauwyl there is an extensive peaty plain, in which, upon the lowering of the lake for further utilisation of the peat, the remains of some curiously-constructed lake-dwellings were discovered. Wooden platforms were met with, resting, not on piles, but upon a series of successive beds of roughly-cut stems lying transversely to each other, the lowest of which reposed on the lake-bottom. Between these layers were branches and brushwood, mixed with clay, and the whole mass was pierced with vertical piles, the tops of which were at least a foot above the upper platform. These layers were as many as five, and the total thickness of the mass when exposed was about 3 feet, but there can be no doubt that, originally, it would have been greater, as there had been considerable condensation of the mass due to decay, especially of the interposing branches. The uprights were not observed to have been in any way connected with the platform, and the only peculiarity in the method of their arrangement was that they were more thickly placed at the corners, as if to keep the wooden mass in position. These artificial structures measured only 10 or 12 feet square, but they were very numerous, and so close that beams from one sometimes reached to the one next it. They were found in various parts of the moor, but in one place they were crowded into a rectangle measuring 90 feet by 50, which was surrounded by several rows of upright piles, as if for common protection. The upright piles were made of oak, alder, or fir, and they penetrated deeply into the shell marl—the stoutest being of oak, measuring 5 inches or more in diameter. It is noteworthy that the lowest horizontal woodwork lay on the shell marl, showing that these dwellings were constructed before the peat commenced to grow. The peat is now at least 6 feet thick., *i.e.* 3 feet of peat lying above the uppermost platforms.

No antiquarian remains were found underneath the wooden structures, but mostly in the intervals between them, where the objects lay almost directly over the shell marl. The settlement appears to have come to an end before the Bronze Age, as no metal object has been met with. A small glass bead is therefore of interest, as showing that the colonists must have had commercial relations with distant countries. Among the other antiquities are the following:—Stone celts (some of nephrite) hafted in staghorn fixings, and flint implements; chisels, pointers, flax-hecklers, etc., of bone; a lump of asphalt, harpoons of staghorn, knives made of yew, and various fragments of pottery with perforated knobs. In the Museum of Lucerne there are a few things, among which are one or two objects showing that the art of boring stone was known (**Fig. 16,** Nos. 1 and 2).

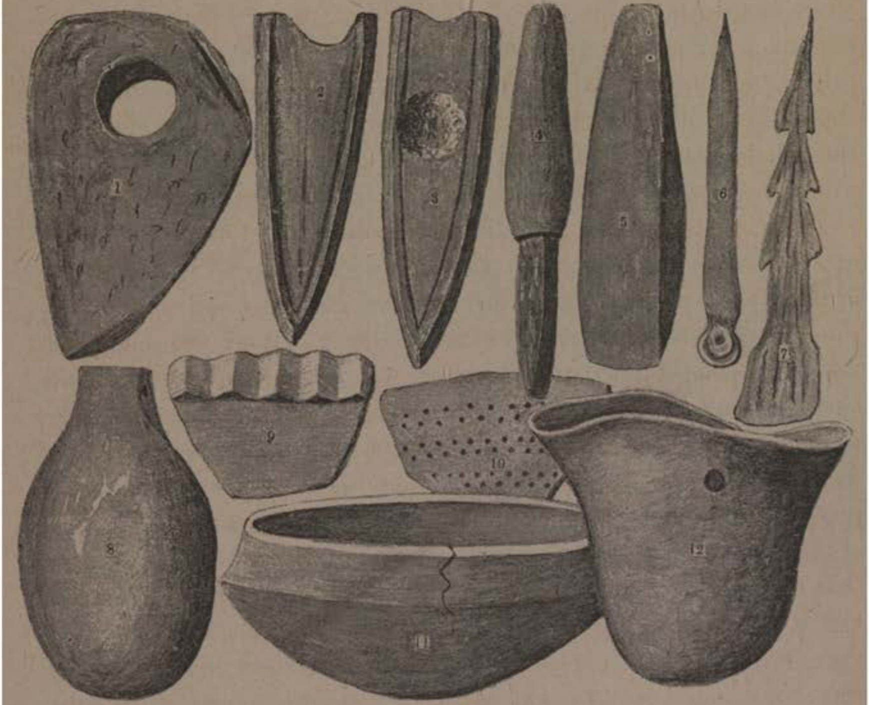

Fig. 16.—Lakes of Wauwyl (1 and 2), Zug (8), and Baldegg. No. 5 = ¼, all the rest = ½ real size.

LAKE OF ZUG. (B. 61 and 126.)

The site of the first discovered settlement in this lake lay a little to the north of the town of Zug. A section of some excavations made for building purposes about 50 feet from the lake showed first a bed of common mould 2½ feet thick, then a layer of sand and rolled stones 1½ foot thick, after which came the relic-bed—a blackish band of decayed organic matter, varying in thickness from 8 inches to 1 foot, and containing the tops of piles and various industrial remains. The heads of the piles were on a level, and in some places cross-beams were observed. The relics include some stone hatchets, one fragment being of nephrite; a few flint objects—lance and arrow-heads, and one knife. There were also portions of sawn stones, apparently for making implements. From a small collection of bones Professor Rütimeyer identified the horse, cow, dog, marsh pig, red deer, roe, and hare.*

The surface of the soil where these discoveries were made was about 15 feet above that of the water in the lake, which of course would leave the relic-bed still on dry land—a peculiarity which is accounted for by the reported deepening of the outlet in former times. This explanation is very probable, as the channel of the Lorze, which carries off the surplus waters of Lake Zug, in passing through the town of Cham, bears evidence of having been artificially deepened. The large amount of detritus conveyed annually into this end of the lake also satisfactorily accounts for the depth at which the relic-bed lies below the surface.

Farther round the head of the lake, at Koller, near Cham, another site was discovered, on which some excavations were made, which revealed a relic-bed 3 feet below the surface. The finds here were broken celts of serpentine, fragments of pottery indicating large vessels. The present level of the lake is 3 feet below this relic-bed.

A third station was at St. Andreas, the evidence of which was the finding of a great number of stone celts, flint knives and arrow-points, over a certain part of a cultivated field bordering on the lake. Peculiar among the finds here are some curious oval objects made of limestone, with a short neck perforated (**Fig. 16,** No. 8).

Traces of three other stations—viz. at Derschbach, Zweieren, and Badeplatz—have been noted beyond Cham, but they have not been carefully investigated. Pottery ornamented with triangular lines and the "meander" pattern would seem to point to a later period. (B. 126, Pl. iii.)

A few of the objects collected on these stations are in a small museum in Zug; others are at Zürich; and in Bern there are 12 stone celts and one of copper, marked as coming from the station at Lorze.

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* The catastrophe which befell Zug in the summer of 1887, by which a portion of the town slipped into the lake, has completely carried away the site of this lake-dwelling station.

BALDEGGERSEE. (B. 253 and 336.)

In the year 1871 the proprietors of the land around this lake reduced its level by drainage some 2½ to 3 feet, in consequence of which indications of lake-dwellings became visible in the vicinity of the outlet. The piles were irregularly placed along the shore, and spread over a wide range. In one place the area attained a breadth of 400 or 500 feet, and again it contracted and the piles only appeared in groups. In making excavations, the tops of piles became more numerous, and at a depth of 7 feet, beds of charcoal, containing nutshells and bits of pottery, were encountered.

Professor Amrein, who conducted the investigations, could distinguish two kinds of piles, some older than others. Horizontal beams were seldom met with. There was no regular relic-bed, as worked implements were found at all depths, from 1 to 8 feet. Some beautiful specimens of bone pointers and serpentine chisels (**Fig. 16,** Nos. 4 and 5) were turned up from a depth of 8 to 10 feet. Beds of clay were occasionally met with, and the piles appeared to have been arranged so as to enclose square huts. In one of the trenches some stone celts were lying on a bed of clay at a depth of 6 or 7 feet. One of these was of a grass-green colour with a transparent edge, and so hard that it could scratch glass. In an adjacent digging, at a depth of 4 feet, a large flat stone, 2 by 1½ feet, was found resting on the tops of six or seven piles, which penetrated through the bed of clay to the shell marl. The space between these supporting piles was filled with clay, and around the stone itself there were scattered bits of charcoal, fragments of pottery, hazel-nuts, etc.

Professor Amrein concludes his report by stating his opinion that this settlement was at its commencement a palafitte, and that subsequently fascine structures were constructed over its ruins.

The relics collected are partly in the Archæological Museum and partly in a small curiosity booth in the Gletscher Garten at Lucerne. Among those in the museum are beautifully-formed daggers and chisels of bone and horn (No. 6); four large harpoons (No. 7) and a scoop of horn; two horn hammers (perforated), and three small cups of the same material (No. 12); horn handles, etc.; rubbers, polishers, and celts of stone in large numbers; two flat pebbles (perforated); and some fragments of stone hammer-axes, one showing an effort to re-bore it (No. 3); several bits of rock crystal and flints worked into saws, scrapers, and arrow-points; fragments of pottery with knobs, and others ornamented with groups of triangular lines, dots, etc., the forms of which are extremely elegant (Nos. 9, 10, 11).

LAKE OF GENEVA.

Leaving the great Jura chain of lakes we come, after a short journey through an upland glacial valley, to the Rhone basin and the Lake of Geneva. On the supposition that this was the route followed by the lake-dwelling founders, the first and most natural position for a settlement would be the bay of Morges; and it is somewhat singular that in this very place one of the largest and most instructive settlements on this lake flourished for successive ages. Here, within a few hundred yards of each other, three sites have been discovered, whose respective remains mark the progressive stages of civilisation evinced in the Stone Age, the transition period, and the most flourishing period of the Bronze Age. It will be therefore of importance to examine carefully the facts disclosed by the repeated examination of these typical stations before referring to the others in this lake. Nor in selecting it am I deviating from the order of discovery, as it was the earliest known and first examined in this part of Switzerland, after Keller's observations and researches at Ober-Meilen had roused the curiosity of antiquaries in the matter.

The existence of piles in the bay of Morges was known to fishermen for a long time, but of course their significance was not understood. However, on the 22nd of May, 1854, Messrs. Morlot and Troyon examined the locality, and speedily demonstrated, by the finding of actual industrial remains, that this had been the site of a *habitation lacustre.* The part of the bay in which these piles were observed was about 500 feet from the shore, and in a depth of water which varied from 8 to 10 feet, even when the lake was at its lowest. Under these circumstances it will be readily seen that it was no easy matter to make investigations; but, notwithstanding the difficulties involved, there was no lack of energy among the local archæologists, who for many years systematically prosecuted the work of fishing up, by means of hand-dredgers, nippers, etc., the submerged remains of these lacustrine villages. Foremost among these explorers were the MM. Forel, of Morges, father and son, whose reports and rich collection of antiquities have chiefly supplied the facts now communicated.

When Troyon (1860) published his well-known book on the lake-dwellings (B. 31), considerable progress had been made in the exploration of the station, and from the richness of the finds it got the name of "La grande Cité de Morges;" but it had not yet been ascertained that there were three separate stations, much less that these stations represented different periods. According to Troyon, most of the piles were of oak, and some had planchettes to prevent them sinking too far in the mud. A portion of one of these supports measured 13½ inches long, 4 inches broad, and 1 inch thick; and contained two square-cut holes 1½ inch in diameter and 4 inches apart. The relics found up to this period were of much interest. Among them were bronze hatchets 4 to 7 inches long, mostly of the winged type, only one having a socket. Of 13 knives, nine had tangs and four had sockets. Two swords, one of which, with flat handle, was whole; two socketed lance-heads; several bracelets of different kinds; and a bronze mould for casting celts* (**Fig. 17,** No. 8). Pottery, clay rings for supports, discoidal stones with marginal grooves, spindle-whorls, a couple of canoes, etc. Subsequently the MM. Forel began to distinguish the respective stations, to which they gave the following names:—(1) "La grande Cité de Morges," (2) "La Station des Roseaux," and (3) "La Station de l'Église."

(1) The Grand City was some 500 feet from the shore, and occupied an area 1,200 feet long by 100 to 150 feet broad. The stumps of its thickly-studded piles were visible in the water never less than 8 to 10 feet deep, and among them were detected some crossbeams, and a canoe, 2 feet wide, with its prow sticking out of the mud. A large and miscellaneous assortment of relics was also collected. Over 450 bronze objects, says Dr. Forel, writing in 1876 (B. 286), were found on this station, and they all belong

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* This mould is in two parts, and it is remarkable as having been found at different times. The first half was found by Mr. F. A. Forel on the 25th of February, 1855, and the second by his son, Dr. Forel, on the 18th of October, 1859. (B. 31, p. 111.)

to the purest type of what Desor calls "le bel Age du Bronze," including swords, knives, sickles, hair-pins, bracelets, etc. One remarkable observation then made was that among 60 bronze winged

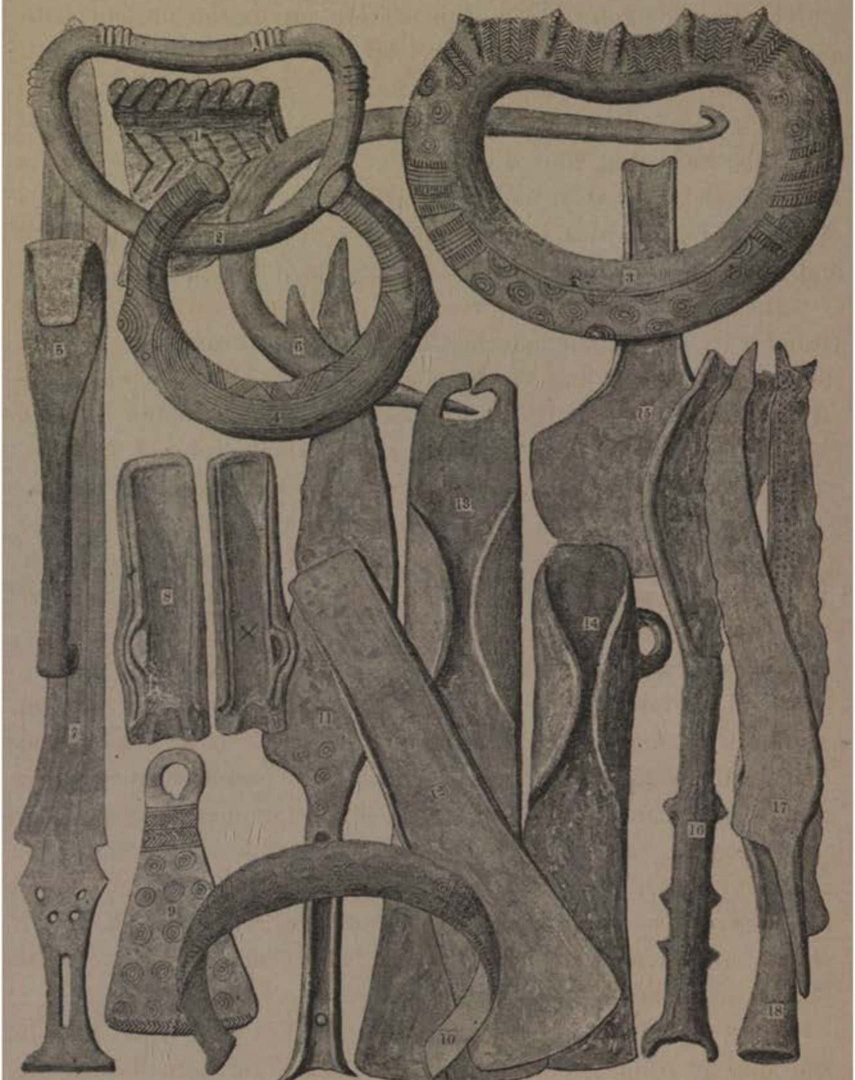


Fig. 17.—Morges, Thonon (1, 2, 9, 10, and 16 to 18), and St. Prex (12). Nos. 7 and 8 = $\frac{1}{4}$, the rest = $\frac{1}{2}$ real size.

celts (Nos. 13 and 14) there was not one single specimen of the flat kind. In 1866 two large reniform rings, one ornamented (**Fig. 17,** No. 3) and the other plain, were added to the list of objects from Morges. Only one object of iron, viz. a poignard, analogous to one from Lake Bourget, was found. Among the osseous remains the stag, goat, sheep, horse, and pig, were identified.

The bronze objects from this station up to the present date are thus enumerated by Dr. Forel (B. 462, p. 55):—

Winged celts, 66; socketed celts, 6; chisels and gouges, 6; swords, 4; lance-heads, 19; knives, 61; sickles, 23; bracelets, 95; rings, 79; hair-pins, 256; divers, 23. In this total of 633 objects are included, probably under the head "épingles," five curious objects of bronze with handles similar to those from Wollishofen and Grosser Hafner at Zürich. (B. 280, p. 699.)

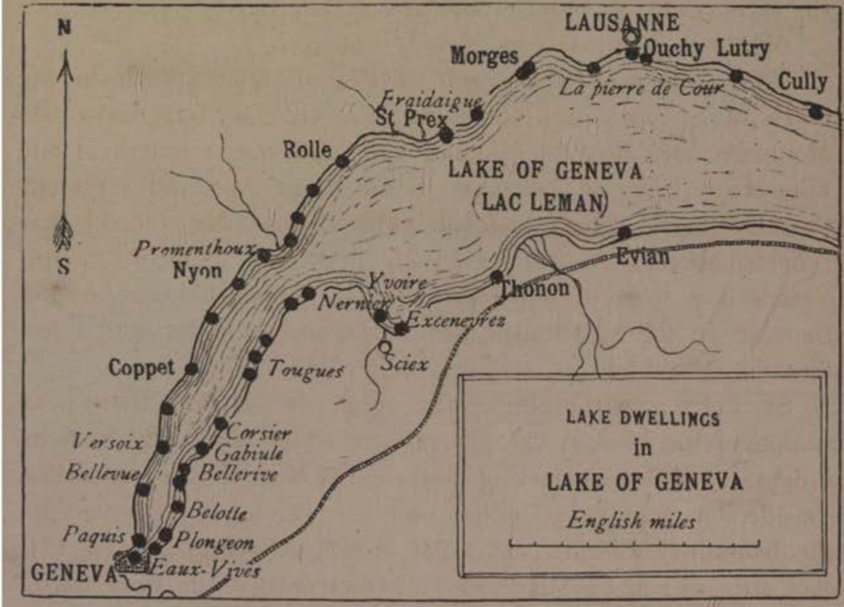
(2) About 450 yards from the northern extremity of the Grand City there was another settlement (Roseaux), of smaller dimensions, which has yielded objects essentially different from those of the former. Here, in marked contradistinction to the Grand City celts, there were 18, all of which were of the flat type (No. 15), and not one with wings or sockets. But, on the other hand, there were a few polished stone celts and flint objects, three small lances, and one hair-pin of bronze, and a few iron sickles of modern type. The pottery was also of a mixed character, showing fragments of dishes of a coarse and fine kind. The piles showed marks as if produced by metal tools.

(3) The third station (l'Église) lies between the shore and the Grand City, and is separated from the latter by a sterile band 220 yards wide. Here there is a decided steinberg, presenting the unusual feature of having 20 or 30 rectangular or oval spaces measuring 13 to 20 feet in diameter without any stones. The antiquities from this station were stone celts (of which 86 are recorded by Dr. Forel up to the present date), stone spindle-whorls, sharpening stones, and some fragments of coarse pottery; but no objects of metal of any kind.

(4) A fourth station is named by Dr. Forel as lying opposite the ancient *poudrière* of Morges, and containing a small steinberg, on which six stone celts and a few other objects of the Stone Age have been found.

The search for lacustrine remains in other parts of the lake was so actively prosecuted that Troyon could enumerate no less than 26 stations discovered during the six years prior to 1860. (B. 31, p. 31.) Since then their number, as recently corrected by Dr. Forel (B. 462), has increased to 44, notwithstanding that eight localities (viz. Villeneuve, Creux de Plan, Lutry, Pully, St. Sulpice, Yvoire, Amphion, and Evian) where supposed lake-dwelling remains have been found are excluded as doubtful or not verified by subsequent investigations.

Though no such fortuitous circumstance as the "Correction des Eaux du Jura" has come to the assistance of the *lacustreurs* of Geneva, they have amassed a very considerable quantity of relics. Only at a few stations, as Thonon and the Port of Geneva, have they benefited from dredging operations carried out for public works. From the results obtained during these favourable conditions, it is quite clear that an enormous quantity of antiquities, especially of the Bronze Age, still lies buried in the waters of this lake.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S
LAUSANNE
Ouchy
Lutry
Morges
Cully
La pierre de Cour
Fraidaigue
St Prex
Rolle
LAKE OF GENEVA
(LAC LEMAN)
Promenthoux
Nyon
Evian
Yvoire
Thonon
Nernier
Excenevrez
Sciex
Coppet
Tougues
Corsier
Gabiule
Versoix
Bellevue
Bellerive
Belotte
Paquis
Plongeon
GENEVA
Eaux-Vives
LAKE DWELLINGS
in
LAKE OF GENEVA
English miles

We shall now make a tour of the lake, jotting the various characteristics of the lake-dwelling stations as we move along. (See accompanying Sketch Map.)

Above Morges are four stations, as follows:—

Station de Cully.—Some piles to the east of the town, but in water from 10 to 13 feet deep. Only a few isolated objects of stone and bronze have been recorded.

STATION DE LA PIERRE DE COUR.—Near Lausanne, at a large erratic block known to bathers as Pierre de Cour, there are a few rows of piles in a depth of 13 feet, and at a distance of nearly 300 yards from the shore. A hair-pin and two small bits of bronze are the only relics recorded.

STATION DU FLON (VIDY).—A number of discoidal stones with marginal grooves, and some stone rubbers and polishers, are recorded from this station. (B. 22.)

STATION DE LA VENOGE.—To the east of the embouchure of the river, near St. Sulpice, and greatly covered by detritus.

MORGES.—Four stations, already noticed.

FRAI D'AÏGUE.—In the gulf of Frai d'Aïgue, a little to the north of St. Prex, are three stations—viz. De Terreneuve, De Monnivert, and De Frai d'Aïgue—extending over a length of one kilomètre. They all belonged to the Stone Age, and represent probably parts of one and the same village. Mr. Colomb has collected more than 200 stone celts in various grades of manufacture in a space of 150 square mètres. From the same station there are in the Museum of Lausanne some 40 stone celts, a few flint flakes and knives, and a spindle-whorl.

ST. PREX.—In the gulf to the south of St. Prex there is a station of the Bronze Age, the piles of which are to be seen in a depth of 10 or 11 feet of water. The station has yielded a considerable number of relics, some of which are deposited in the Lausanne Museum, viz. a flat bronze celt (**Fig. 17,** No. 12), clay support-ring, portions of clay crescents, seven stone celts, three or four fragments of pottery ornamented with curved lines and cable pattern (one fragment of black pottery is ornamented with tin strips), a bronze pin with spherical head, a large block for sharpening tools. The other bronzes known from the station are four knives, one bracelet, five rings, and 11 pins.

ROLLE.—Situated opposite this town there appears to have been a lacustrine village of considerable size, which has yielded objects characteristic of both the Stone and Bronze Ages. Part of the area occupied with piles has been covered over by an artificial island, now bearing a monumental *obélisque.* Fragments of pottery of the same character as those from Morges, discoidal stones, hammer and sharpening stones, were among the relics.

Dr. Forel enumerates the bronze relics from this station as follows:—Two winged hatchets, one chisel, one lance, two knives, one sickle (now in the Lausanne Museum), one bracelet, 15 rings, and nine hair-pins. (B. 462.)

To the south of this is the *Station de Beaulieu*, of considerable extent, but poor in relics, only some 10 bronze objects having been found on it. (*Ibid.*)

STATION DU CHÂTAIGNIER.—A small Stone Age station before the village of Dully. (*Ibid.*)

STATION DU CREUX DE LA DULLIVE.—A great circular station of the Bronze Age, on which two winged celts, two bracelets, and a few rings and hair-pins have been collected. (*Ibid.*)

NYON.—According to Dr. Forel (B. 286), there are two stations in the bay of Nyon—one at Promenthoux (Stone Age), to the right of the embouchure of the river; and the other (Bronze Age) to the north of the town of Nyon. Mr. A. Revilliod found on the latter station a remarkable object, consisting of 300 rings of bronze, from 7 to 8 inches in diameter, which became adherent to each other by a concretionary deposit from the lake. The total number of bronze relics from Nyon is 62, thus relegated:—Seven winged celts, one chisel, one lance-head, 10 knives, two sickles, 15 bracelets, 23 hair-pins, and three undefined objects.

We now enter the lower portion of the lake, where its breadth becomes suddenly contracted from 8 to 3 miles; and here it would appear that the lake-dwellers had thickly planted their peculiar villages on both sides of the lake. Along the shore, from Nyon downwards to where the Rhone makes its exit, and then up on the other side to the opposite point of Ivoire, Dr. Forel (B. 462) enumerates no less than 22 stations, in the following order:—

STATION DE CÉLIGNY.—Just before the landing-pier. Bronze Age.

STATION DE COPPET.—Discovered in 1874 by M. Magnin. Bronze Age.

STATION DE MIES.—Discovered in 1877, opposite the Château des Crenées. Bronze Age.

STATION DE VERSOIX.—A great station near the landing-pier. Bronze Age. Hatchets and knives of iron are said to have been found on this station.

STATION DE BELLEVUE.—Discovered in 1880, to the north of landing-pier. Bronze and Stone Ages.

STATION DES PÂQUIS.—Extends southwards from the jetty of the new port. Stone Age.

STATION DES EAUX-VIVES.—Outside the port, along the suburb of this name. Stone Age.

CITÉ DE GENÈVE.—A vast station occupying the present port. Bronze Age.

STATION DE PLONGEON.—At the northern end of the Station des Eaux-Vives, in a contracted spot, Dr. Gosse has found some 30 objects of iron, some of which resemble those of La Tène.

The last four are generally known as the Stations of Geneva, so that the lower extremity of the lake must have been actually studded with settlements. At the foot of the largest of the two well-known and superstitiously-revered boulders called Pierres à Niton were found, about the middle of last century, a knife (**Fig. 18**, No. 5) and a celt of bronze of the flat type, which are still preserved in the Museum of the town. Near this was the Bronze Age station called by Dr. Forel "Cité de Genève," but sometimes described as the Station des Eaux-Vives. It would appear that there are two stations described under the latter name—one of the Stone Age, about 100 yards nearer the shore; and the other of the Bronze Age (" Cité de Genève ").

The Cité de Genève is now the richest bronze station hitherto investigated in the Lake of Geneva. It occupied a horseshoe-shaped area, filling the entire space presently forming the port, and even sent a prolongation down to Rousseau's island. Dr. Forel estimates the number of bronze objects collected here at 1,500, being rather more than the total number from all the other stations in the Lake of Geneva.

At its northern extremity, next the Station des Eaux-Vives, Dr. Gosse came upon what must have been the site of a foundry. Here, in a confined space not exceeding 100 square yards, he fished up no less than 50 stone moulds, crucibles, ingots of bronze and tin, scoriæ, and other materials of the founder's art. (B. 462.)

Most of the objects of general interest from this station have been deposited in the Archæological Museum. Dr. Forel classifies those of bronze as follows:—25 winged hatchets, 19 socketed hatchets, four flat hatchets, seven chisels and gouges, four swords, seven lance-heads, 72 knives, 22 sickles, 75 bracelets, 230 rings, 1,000 hair-pins, and 60 diverse objects. In looking over this collection I made the following notes:—The socketed celts have the loop generally at right angles to the cutting edge. The knives are both socketed and tanged. Bracelets show a great variety of forms, but the solid ones predominate. Sickles have more frequently a raised button. The ceramic art shows the usual Bronze Age decoration of triangles, and the paste is of two qualities. Clay ring-supports, spindle-whorls, discoidal stones, etc., are very abundant. Among the odds and ends are to be noted pins with large perforated heads, fish-hooks, buttons, a large plaque with repoussé work of slightly-raised bosses, a rude image like a stag of bronze, a variety of pendants, small tin wheel-like objects in concentric circles, etc. A few of these objects are represented on **Fig. 18,** all of which, except Nos. 9, 10, 12, and 13, are from this station and deposited in the Museum at Geneva.

STATION DE LA BELOTTE.—A large station, rich in Stone Age relics. A couple of bracelets and a few rings and hair-pins of bronze, in all 21 objects, are among the treasures from this settlement, which comprise no less than 1,400 stone celts.

STATION DE LA POINTE DE LA BISE.—Immediately to the north of La Belotte there is another station, said to be one of the transition period, owing to its having supplied a couple of flat axes. The only other metal objects are a few rings and hair-pins.

STATION DE BELLERIVE.—A large station yielding objects both of the Stone and Bronze Ages.

GABIULE.—Before the steamboat landing-stage are two stations —one of the Stone Age; and another, in deeper water, of the Bronze Age.

STATION D'ANIÈRE (BASSY).—A small Bronze Age station in deep water.

We next come to a group of four stations, all within a compass of two miles, which are sometimes confounded with one another, and described as "Les Stations de Tougues." One is near Hermance, and is known as the Station de la Vie à l'Ane or du Moulin; a second is vis-à-vis de la Fabrique Canton; a third is opposite the Château Beauregard; and a fourth, Creux de Tougues, lies before the village of Chens. These settlements were all parallel to the shore, and their remains are in deep water. Their relics are of a mixed character, and would indicate that, while founded in the Stone Age, they subsisted during that of Bronze.

The station at Creux de Tougues is the most important of

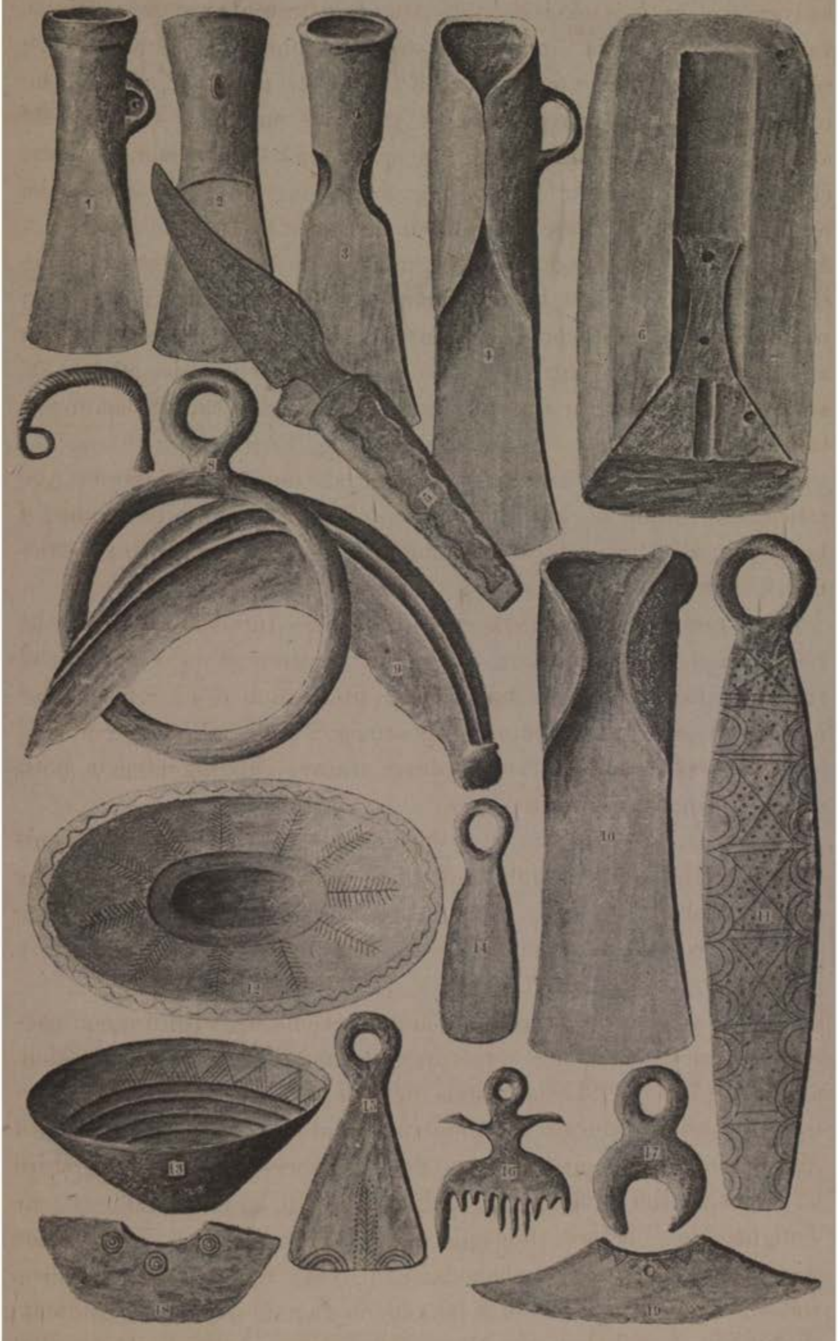
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Fig. 18.—Geneva and Tougues (9, 10, 12, and 13). Nos. 6, 12, and 13 = ¼, the rest = ½ real size.

the group, and it has furnished a large number of antiquities. It is about 130 yards from the shore, in a depth of water varying from 5 to 10 feet. Ordinary stone celts, 27 of which have been collected (B. 462), were found on the part next the shore. The collection of bronze objects consists of:—Four winged celts (**Fig. 18,** No. 10), one flat celt, two socketed chisels, one sword, one lance-head, 21 knives, five sickles (No. 9), 14 bracelets, 120 rings, 170 hair-pins, and six diverse objects. Pottery from this station (Nos. 12 and 13) comes largely to the front, and in the Museum of Geneva there are fine specimens of plates, cups, vases, and other vessels of a fine black ware which, both in form and ornamentation, resemble those from the palafittes of Lake Bourget and others of the Bronze Age in Switzerland. Spindle-whorls, discoidal stones with a marginal groove, rubbing stones, etc., are also abundant. A peculiarly-shaped stone object known as "gorge de poulies" comes here to be noted. (B. 31, 281 and 462.)

MESSERY.—Piles are here seen projecting above the mud 2 to 5 feet, in a depth of about 12 feet of water. One of the piles pulled up by Troyon showed markings of a metal tool. Numerous fragments of pottery characteristic of the Bronze Age have been found, but only two objects of this metal, viz. a winged celt and a sickle.

NERNIER.—Two stations are described in the vicinity of the village of this name. One, near the shore, and partly covered up with gravel, belonged to the Stone Age. Here Troyon observed some large piles in a depth of 6 feet of water, and others he found on the shore buried in the gravel. Among the objects collected are flint flakes, spindle-whorls, hatchets of serpentine (a perforated one is in the Museum of Annecy), some worked bones, etc.

The Bronze Age station is 600 yards to the west of the village, and 150 from the shore. The relics consist of pottery, spindle-whorls, ring-supports, etc. Among the bronze objects are: —Eight winged celts, two chisels, one sword, two lance-heads, three knives, three sickles, five bracelets, three rings, and five hair-pins. Among the rings is included a pendeloque, in the form of a large hollow ring, attached to which is a small ring for suspension.

STATIONS D'EXCENEVREZ ET DE COUDRÉ.—In rounding the point of Ivoire we come to a sheltered bay, into which a couple of streams discharge their waters, carrying down a considerable amount of *débris*, so that the lake-dwelling remains are here deeply buried. Traces of two stations have, however, been observed, one, station De Moulin-Pâquis, near Excenevrex, and the other, De Coudré, opposite Château Bartholoni, not far from the village of Sciex. Both appear to belong to the Stone Age, and in the latter, in 1874, 12 stone hatchets were found.

THONON.—There were two separate settlements at Thonon. One (Stone Age), about 20 yards from the shore, was discovered in 1862, when the new port was being formed. The objects there collected were piles, flint implements, stone hatchets, spindle-whorls, and some coarse pottery.

The Bronze Age station was considerably in advance of the former, and in a depth of 3 to 4 yards. The settlement was extensive, and ran parallel to the shore, and from its remains a large assortment of relics has been collected. Being among the earliest discovered in the Lake of Geneva, it has been industriously searched by a number of well-known archæologists, as Troyon, Forel, Revon, Monod, Revilliod, Carrard, etc., and consequently its treasures are widely distributed. The bronze objects, according to Dr. Forel (B. 462), amount to 48, viz. 11 winged celts, two lance-heads, six knives, two sickles, 14 bracelets, two rings, five hair-pins, and six diverse objects. One of the knives, which is finely ornamented and one foot in length, has the peculiarity that the handle contains less tin than the blade (**Fig. 17**, No. 16). Another knife was adapted for side-plates to be riveted on its handle (No. 11); while others were socketed and tanged (Nos. 17 and 18). Some of the hatchets have a side loop, and others are devoid of it. Among other things are a large ring, *armilla sacra* (Carrard), (No. 2); a pendant of three involved rings, together with various other pendants (No. 9). Among the pottery are fragments with perforated knobs, herring-bone pattern (No. 1), etc.; and some charming vases, clay ring-supports, etc.

There are thus, according to Dr. Forel, 11 stations of the Stone Age; three of the period of transition (*i.e.* with hatchets of bronze of the flat type), six with mixed objects, 19 of the Bronze Age, and one (Station de Plongeon) which furnished objects characteristic of the early Iron Age.

These notes have been collected from a fragmentary and widely-scattered literature, including the following original sources:—B. 22, 31, 34, 40, 121, 126, 138, 152, 280, 282, 286, 315, 377, and 462.

LAKE LUISSEL, CANTON DE VAUD.

In a small valley among the heights above Bex, adjoining the Rhone valley, there were found, in 1791, while a canal was being dug for facilitating the cutting of peat, some industrial remains which point to the existence of a lake-dwelling of the Bronze Age. At the north of the basin, and at a depth of 6 feet, a quantity of bones (some human), grains of corn, bronze rings, the tip of a scabbard, and three remarkable swords (from 23 to 26 inches in length) were encountered (**Fig. 19**). The swords are still preserved, and indubitably belong to the most flourishing period of the Bronze Age. In the summer of 1859 Mr. Troyon made excavations in the turf of the former bed of this lake, but found only a portion of worked wood, which might have been used as a handle for a stone hatchet. According to an old tradition in the neighbourhood, a château once existed here which had been engulfed in the lake. (B. 31.)

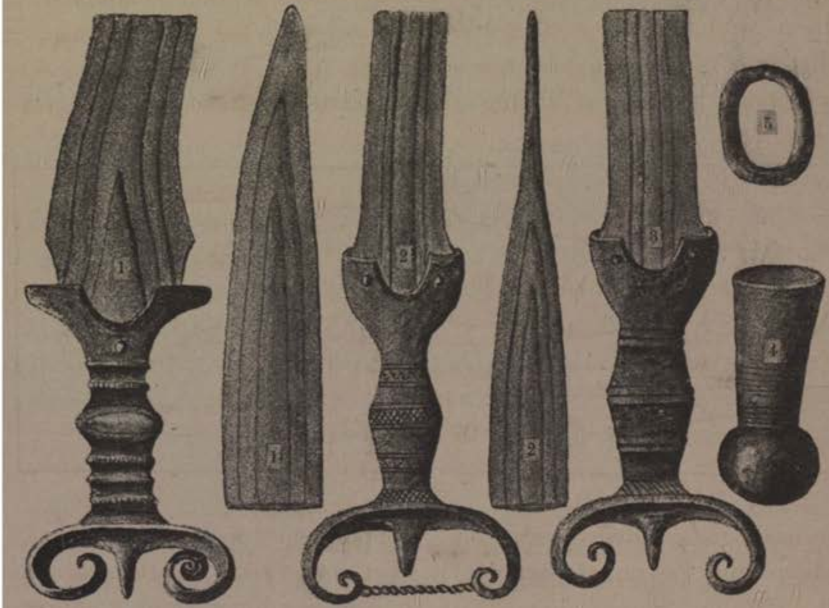
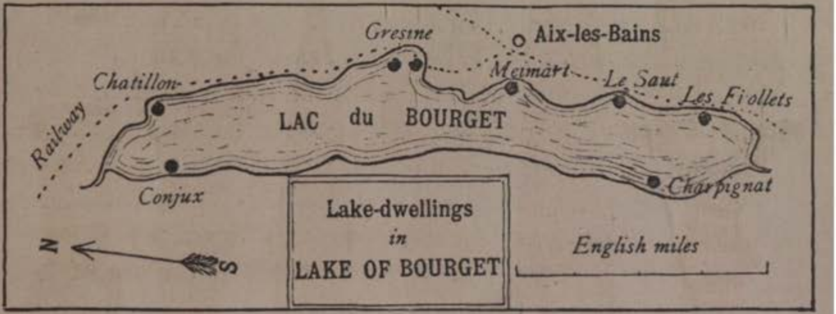


Fig. 19.—LUISSEL. All ⅓ real size.

LAKE BOURGET.

As early as 1856, while the Mont Cenis and Culoz railway was being constructed, some antiquities were dredged up in the bay of Grésine, in Lake Bourget, which the engineers surmised to be remains of a lake-dwelling. Though this information was formally communicated to the Société Savoissienne, it was not till 1862, in consequence of renewed attention to these discoveries by Baron Despine and M. Desor, that this society took steps to investigate the matter. A preliminary investigation conducted by a committee of seven gentlemen was considered so satisfactory that the committee was renewed, with funds at its disposal for systematic researches among the palafittes. Since then several archæologists have conducted independent researches, among whom may be noted particularly Le Comte Costa de Beauregard, MM. Rabut, Perrin, Revon, Cazalis de Fondouce, and Chantre. (B. 73, 138, 176, 179, 282.)



The combined results of these explorers have now established the fact that there were eight settlements in this lake, all of them belonging to the Bronze Age. The antiquities fished up have been very numerous, but unfortunately they are widely distributed, many indeed being in private collections. The largest proportion is, however, to be found in the Museums of Chambery, Aix-les-Bains, Annecy, and St. Germain, and the private collection of Count de Beauregard in his château on the Lake of Geneva. (For relative position of these stations see Sketch Map of Lake Bourget.)

CONJUX.—This station is 200 yards from the shore, opposite the village of the same name. A group of piles only 50 yards from the shore is supposed to have been the ruins of a Roman pottery business, on account of the abundance of characteristic ware found among them. A peculiarity of this station is the number of moulds found on it in proportion to the other objects, no less than 13 being recorded up to 1875, representing all manner of industrial implements, as knives, winged and socketed celts, sickles, hammers, pins, rings, and buttons.

CHATILLON.—This settlement occupied a sheltered position about 500 feet from the shore. In one part the piles project out of the mud, and are all inclined towards the east at an angle of 45°, but in the rest of the station they are straight. A vessel of earthenware, like the later productions of the lake-dwellers, was found among these piles with the name Severinus stamped on it in Roman characters. (B. 176, p. 24.) Here were found some 40 or 50 of these very remarkable vessels of black earthenware, ornamented with tin strips forming a combination of pleasing designs (**Fig. 193,** Nos. 4 and 5); also some fragments of Gallo-Roman pottery, and others of a very early type. Among the relics are eight moulds (one of which is for a lance-head) and about 320 objects of bronze.

GRÉSINE.—The bay of Grésine contains the sites of two settlements—one close to the railway, and the other farther out and of larger extent. The latter appears to have been connected with the Pointe de Grésine, as a gravel bank runs from this part of the shore to the site of the palafitte; and the two stations were connected with a gangway, the remains of which have been traced. The railway just touches the site of the inner station, to which accident the discovery of palafittes in Lake Bourget is due. Although the stations at Grésine have been more frequently searched than any others, owing to their proximity to Aix-les-Bains, they have continued for a long time to be the richest in all kinds of antiquities, carbonised fruits, etc. Among the moulds is one for the handle of a sword on one side, and a buckle on the other. (B. 282, Pl. liv. 2.) No less than five bronze hammers have been found on this station, all of which are socketed and cylindrical in shape. Last summer some remarkable objects were fished up, which I saw in the collection of the finder at the Restaurant Lacustre (Port Puer), some of which are here figured (**Fig. 21,** Nos. 4, 6, and 12).

MEIMART.—The *débris* of this settlement lies about 100 yards from the shore, under 16 to 20 feet of water, and hence it has been less searched, although it is of considerable extent, and has yielded a few antiquities, notably a bronze sword, moulds, fragments of pottery, and a Roman vase.

LE SAUT.—This settlement, like the others, was on a slight elevation some 110 yards from the shore, and at low water its relics have to be fished from a depth of about 10 feet. The station has been well explored, and it has been observed that the ceramic remains indicate greater technical skill the farther out in the lake they are picked up, and where the piles are seen to project higher above the mud. A piece of timber 22 feet long, with numerous mortises at each end, and a bone harpoon with one barb, like those of bronze from Peschiera, are the only objects which distinguish the antiquities of this station, which in general are very similar to those from Grésine.

LES FIOLLETS.—A small settlement in 15 to 20 feet of water. The few bronze objects found here are covered with calcareous matter. Some of the pins collected on it are of novel forms, but the most interesting object is a small file, which may be seen in the Museum at Chambery. Mortised beams were also fished up from this station.

CHARPIGNAT.—Some piles have been observed near the village of Bourget, but the associated industrial remains, if any, have not yet been revealed.

In 1875 Mr. Perrin made a series of elaborate statistics, by which he estimated the entire number of bronze objects from the palafittes in Lake Bourget at a little over 4,000, and tabulated them in various categories according to their uses, indicating the stations on which they were found, and the museums or collections in which they were then located. (B. 282.) Since then so many additional relics have been recovered from the palafittes that Mr. Perrin's tables can offer no approximation to accuracy; but, nevertheless, they have a certain value in showing the relative frequency of the different objects. I have, therefore, taken the liberty of reconstructing from Mr. Perrin's data the following list of the objects found in Lake Bourget, which gives a better general idea of the culture and civilisation of its lake-dwellers than pages of descriptive details:—

Lake Bourget.

		Grésine.	All Stations.
Founders' Materials	Moulds	22	49
	Ingots and Castings	46	171
Utensils and Instruments	Hammers	5	7
	Hatchets	19	38
	Chisels	2	4
	Gouges	1	1
	Sickles	7	23
	Knives	35	126
	Paring Knives (Tranchets)	4	13
	Razors	18	32
	Stamp	—	1
	Borers, etc.	32	164
	Saws	1	2
	File	—	1
	Rivets and Nails	115	248
	Needles	46	190
	Fish-hooks	38	144
	Pincers	5	7
Arms	Swords	2	3
	Daggers	9	12
	Lances	5	16
	Arrow-heads	23	49
	Shields	1	2
Objects of Ornament	Hair-pins	163	798
	Fibulæ	2	2
	Bracelets	82	252
	Torques	1	2
	Finger-rings	32	121
	Earrings	4	22
	Girdles	1	1
	Buckles, Rings, etc.	140	598
	Pendants	7	16
	Clasps	7	50
	Buttons	35	63
	Brackets, etc.	43	185
	Beads	115	488
	Tubes and Spirals	8	73
Diverse Objects		34	108
	Total	1,110	4,002

General Remarks on the Palafittes of Lake Bourget.—Count Costa de Beauregard, in his excellent article on the "Habitations Lacustres du Lac du Bourget" (B. 176), states that the stakes on which these villages were reared were generally of oak, measuring from six to eight inches in diameter, and that they were placed at a distance of 100 to 200 yards from the shore, in a depth of 4 or 5 yards of water. Their lower extremities almost always bore cutting marks, which could only be made by metal tools. The great differences as regards their state of preservation show that the settlements had been occupied for a long time, necessitating the renewal of the piles at different epochs.

The Count also believes that all the palafittes of Lake Bourget were constructed during the Bronze Age, in regard to which he thus writes:—"Malgré les quelques instruments de silex et les hachettes de pierre rencontrés dans nos fouilles, il est peu probable, comme je l'ai déjà dit, que ces bourgades aient été fondées à l'Epoque de la Pierre. Tout nous porte à croire, au contraire, qu'elles florissaient à l'Epoque du Bronze, période qui a dû être de fort longue durée en Savoie, car il a fallu bien des siècles pour accumuler sur les différents points que nous avons explorés une pareille quantité d'objets et de débris de toute sorte." (*Ibid.*, p. 23.)

Relics.—*Weapons.*—The swords recovered are few, and of one type (**Fig. 20,** No. 16). That they are of home manufacture is more than probable from the finding of portion of a mould of the same class of weapon, now deposited in the Museum of Chambery. Only a few tips of scabbards hitherto found (**Fig. 21,** No. 20). The daggers were both tanged and riveted to their handles. Lance-heads (Nos. 1 to 4) are all socketed, with only one or two exceptions (Nos. 5 and 12), which might be daggers. They are generally unornamented. Arrow-points are formed for the most part of triangular plates of bronze, with two or four holes for fastening them to the stem; but other forms are met with (**Fig. 21,** Nos. 13, 22 to 26, and 32).

Implements.—Hatchets (**Fig. 20,** Nos. 9, 10, 11, and 17) are both winged and socketed, and the latter have their sockets round, oval, or rectangular. The chisels and gouges are all socketed (No. 19). Sickles (Nos. 20 and 21) have nearly all a raised button for fixing the handle (in which respect they differ from those of Switzerland), and may be classified under a variety of groups

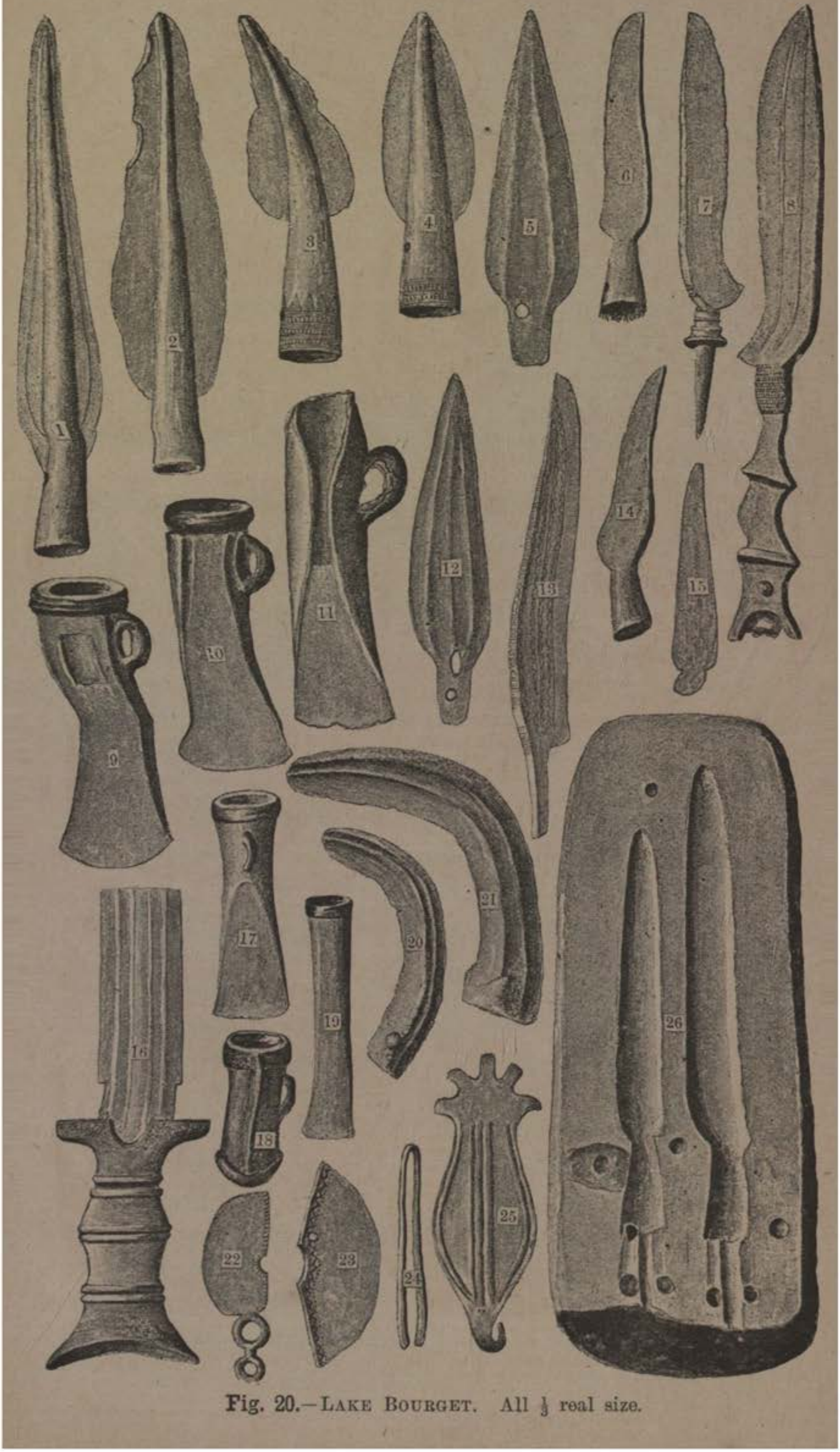

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Fig. 20.—Lake Bourget. All ⅓ real size.

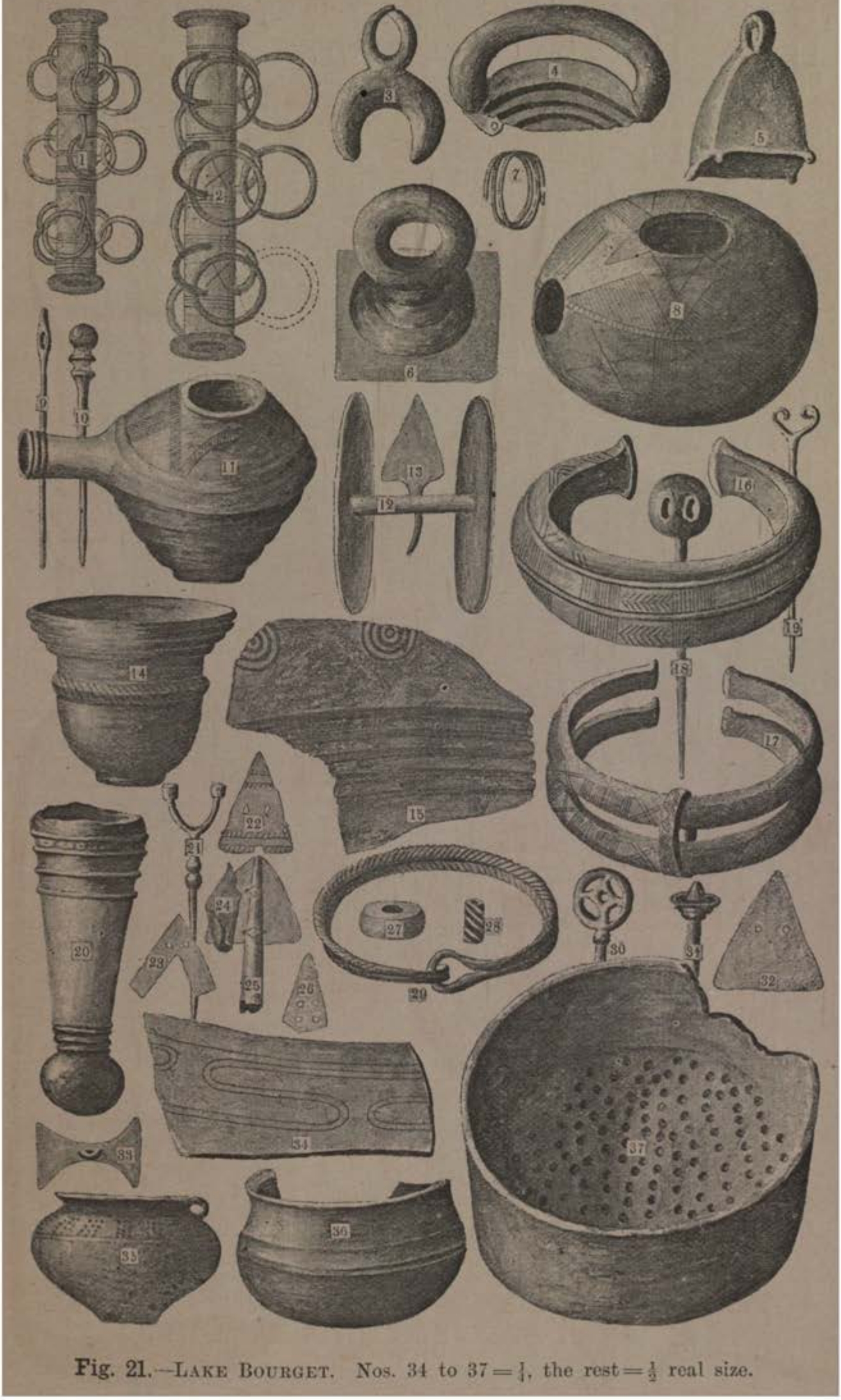
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Fig. 21.—Lake Bourget. Nos. 34 to 37 = ¼, the rest = ½ real size.

dependent on the degree of curvature and the disposition of their raised ribs. The knives are socketed, tanged, and with a solid handle (Nos. 6, 7, 8, 13, and 14); the former being most, and the latter less, frequent. Razors are of two kinds, with or without a handle (Nos. 22 and 23). Needles have the eye either at the end or middle. Awls and a variety of fish-hooks are abundant; but spears or harpoons are very rare. Rivets, nails, and bits of thin bronze plates, are in some places abundantly met with. Examples of saws and files have been found, but in small numbers.

Ornaments.—Pins with large round heads are very rare, as are also those with wheel heads (the various forms are shown in **Fig. 21,** Nos. 10, 18, 19, 21, 30, and 31). Bracelets (Nos. 16, 17, and 29), which are numerous, and mostly open, are either solid or hollow (one is of tin); fibulæ and torques rare; finger-rings are of two kinds, plain and spiral (No. 7); portions of girdles, buckles, pendants (No. 5), buttons (No. 33), bronze beads, and small spirals, are abundant; a clasp is like one from Mörigen (**Fig. 20,** No. 25). Tin appears in ingots, in a bracelet, discs, and thin strips for ornamentation to dishes; also gold in the form of a few portions of twisted wire or leaf. Several bronze vessels. One charming little vase (**Fig. 21,** No. 14) of cast bronze, figured by Count Costa de Beauregard, and now in his possession, was found at Grésine along with a sword (**Fig. 20,** No. 16), a knife (No. 8), and about 250 nails supposed to have been used in the manufacture of a shield. Nos. 1 and 2 of **Fig. 21** represent two remarkable objects from Grésine, now exhibited in the Museum at Aix-les-Bains. A similar object, but more worn and minus some of its rings, is in the Museum at Chambery; and a fourth is in the Museum Lacustre at the Port (**Fig. 195,** No. 4). Crescents, spindle-whorls, fragments of cloth, bits of plaited rushes and basket-work, glass in small coloured beads, and amber (**Fig. 21,** Nos. 27 and 28), also in small beads, are all fully represented.

The articles represented by Nos. 4, 6, and 12, may be the brass ornaments on a set of harness; but as to the two curious vessels of bronze (Nos. 8 and 11), I am unable to assign any use.

The pottery shows great skill in the ceramic art. It is of a grey, black, or red colour (Nos. 34, 35, 36, and 37). Vessels combining the three colours, in various geometrical forms, with linear ornamentation, have been found among them, and others with ornamentation reminding one of the impressions of fern-leaves (*Polypodium vulgare*).

A few iron spear-heads (**Fig. 198**) and knives, as well as Roman tiles and pottery, have also been collected from these palafittes.

The domestic and wild animals, so far as they have been identified, are similar to those from the Swiss lake-dwellings.

LAKE ANNECY.

Since 1856 piles have been discovered in several places in Lake Annecy, but owing to the depth of water and the accumulation of mud, their associated relic-beds could not be easily examined. Up to the present time only four stations have been sufficiently investigated to enable us to form some idea of their chronological position with respect to the other remains of lake-dwellings. These are Stations du Port, De Vieugy, Du Chatillon, and Du Roselet.

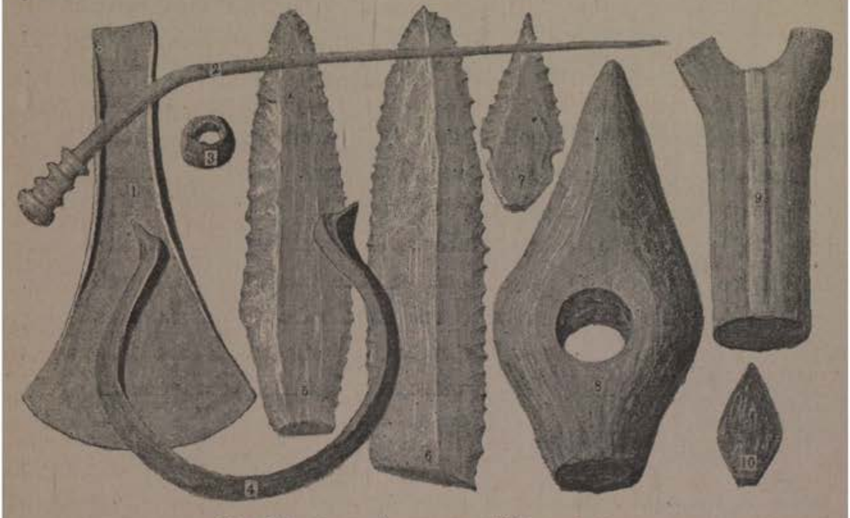

Fig. 22.—LAKE ANNECY. All ½ real size.

The first-named (Station du Port) came to light only in the beginning of 1884, when the little harbour at the town of Annecy was being deepened to facilitate the movements of the pleasure-steamers which ply on the lake during the season. In the course of these operations the dredging-machines came into contact with piles, and brought up various kinds of stone implements, etc., in the mud, which, unfortunately, were mostly re-deposited in deep water. The spot where these remains were found lies just at the extremity of the Swan Island; and after the public works were completed, the dredger was put at the disposal of the Société Florimontane, who conducted systematic investigations, both there and at the stations of Roselet and Viéugy. Previous to this time all the stations examined had yielded more or fewer bronze objects, and they were therefore considered to be analogous to those of Lake Bourget, all of which were founded during the Bronze Age. The explorations conducted at the Station du Port upset this view, as from the character of the relics found on it there could be no doubt that its inhabitants lived chiefly during the Stone Age, but the station survived to the Bronze Age. The objects collected from it consist of perforated hammer-axes of serpentine (**Fig. 22,** Nos. 8 and 9), polished hatchets of serpentine, stone spindle-whorls, beautifully-worked daggers and lance-heads of flint (Nos. 5, 6, and 7), as well as arrow-heads, (one of shale stone No. 10), saws, scrapers, etc., of the same material. Only two metal objects, viz. a bronze hair-pin (No. 2), and a bead (No. 3), probably of copper, like those from Vinelz are recorded; but these are said to have been on the surface of the relic-bed.

STATION DU ROSELET was the first discovered in this lake, but it has yielded only a few relics, among which are fragments of pottery, some fine spindle-whorls, a hatchet of serpentine, and a bronze bracelet.

CHATILLON was in a depth of 8 to 13 feet, and among its relics are a socketed knife and a couple of bracelets (No. 4).

The settlement at Vieugy was discovered in 1868, and the most important objects from it are a bronze hatchet of the flat type (No. 1), some stone moulds, and a few rubbers. (B. 315.)

LAKES OF AIGUEBELLETTE AND THUILLE.

M. Troyon reported the existence of piles at two places in the Lake Aiguebellette, and one in Lake Thuille; but of these I find no further records. (B. 31.)

LAKE CLAIRVAUX (FRANCE).

The Lake of Clairvaux is situated on the first rising plateau of the Jura mountains, not far from the town of Lons-le-Saulnier, and covers an area of about 200 acres. At its north-west extremity there is a tongue of land projecting into the lake called

La Motte-aux-Magnins, which is believed to have been an island in former times, but is now continuous with a tract of marshy ground which extends between the Motte and the town of Clairvaux.

It has been recorded that at various times prior to 1870 diverse antiquities were found in the course of drainage operations in this marshy ground, such as horn implements, stone axes of flint and jade, boars' tusks, bits of pottery, bronze celts, a fibula, and an armilla; also Gallo-Roman remains, including a Gaulish gold coin and Roman coins. In the lake itself there were no discoveries made, with the exception of a group of five piles known to fishermen. But none of these discoveries had ever suggested to any one the idea of a lake-dwelling, the common and accepted opinion being that they were remains of Druidical times and customs.

On the 27th of June, 1870, when the water was about its lowest, Mr. Le Mire happened to be walking on the shore and accidentally stumbled on the top of a black pile of oak. His attention being thus directed to such a curious object, he looked about and detected many others just protruding from the lake-bottom. He then determined to investigate the matter, and at once employed some labourers to make excavations. The place selected was 100 yards to the west of the Motte-aux-Magnins, and 25 yards to the east of the canal which forms the outlet of the lake. Trenches were dug about 1 yard in width and the same in depth (a greater depth being prevented by the oozing up of water). During these operations piles were abundantly met with, but no relics were found, and it was remarked that there was no change in the stuff thrown up from the trenches, it being the ordinary whitish deposits similar to what is seen on the present surface of the strand. The piles were of oak, fir, yew, poplar, willow, and hazel, and measured from 4 to 6 inches in diameter.

Mr. Le Mire then shifted his operations to the south side of the Motte-aux-Magnins, and after passing through 6 to 8 inches of the whitish surface deposits he came upon a blackish peaty layer containing roots of water-plants and other organic *débris*, which turned out to be the veritable relic-bed of the lake-dwellers.

Here he continued the excavations for about three weeks with a couple of workmen, and in this way an area of about 120 square yards was examined, which he thinks was not more than a twentieth part of the total site of the lake-dwelling. The piles did not reach the surface, but they were met with abundantly, no less than 150 being counted in the space examined. The breaking-out of the war put a stop to these excavations, and the subsequent return of the water to its ordinary level prevented their renewal.

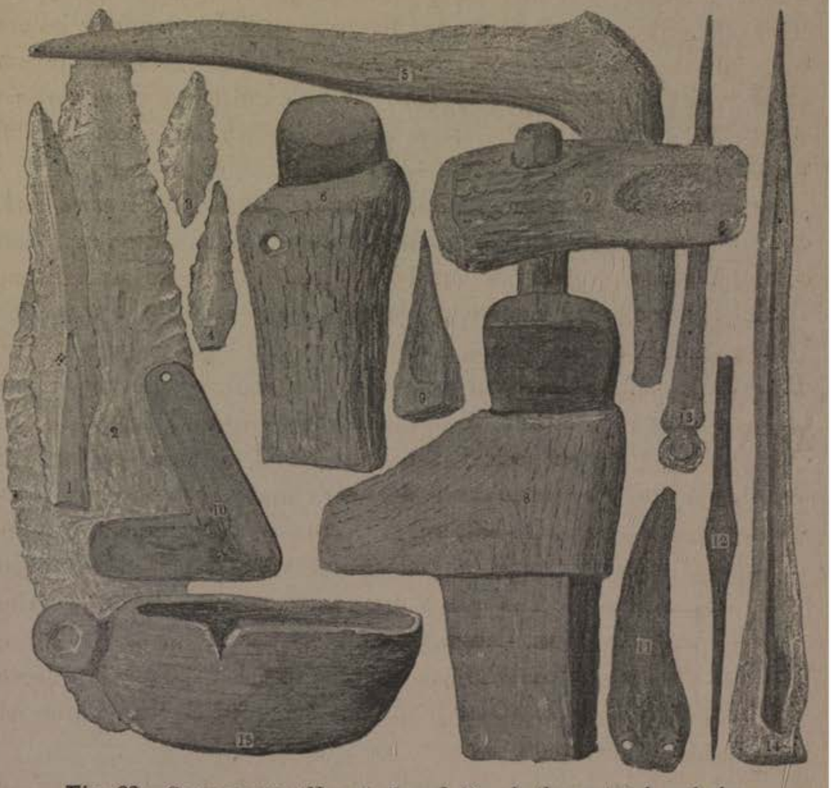

Fig. 23.—Clairvaux. Nos. 5, 7, and 15 = ¼, the rest = ½ real size.

Mr. Le Mire has published an illustrated report of his investigations (B. 219), from which these notes are taken, but the accompanying illustrations (**Fig. 23**) are from a selection of objects exhibited in the anthropological section of the Paris International Exposition of 1889. In this collection I note that there are a few relics, such as the two bronze objects, to which Mr. Le Mire does not refer in his report; probably these may have been found since its publication.

Among the relics staghorn implements take a prominent place. Handles and fixers for stone weapons amounted to 49, and the two here illustrated (of five exhibited in Paris) still retain their celts (Nos. 6 and 8). There are several perforated horn hammers, one of which (No. 7) retained portion of its wooden handle when found; another is a foot long, and the perforation is nearer the burr of the horn which forms the hammer-end. A tyne 11 inches long forms the handle to a small stone chisel. Another object (No. 5) is a *unicum* of its kind. It is a chisel of horn formed from the tyne, with the body of the horn forming a neatly-polished handle.

The polished daggers or pointers are also finely made, and almost remind one of those at Laibach. Twenty-six were exhibited in Paris, three of which are here represented, including the largest and smallest (Nos. 9, 13, and 14).

About a dozen triangular or leaf-shaped arrow-points, and one or two spear-heads of flint. Of the latter, one (No. 2) is remarkable for its size and elegant workmanship.

Wooden dishes formed out of the solid, all having a round base, were collected to the number of 15, and some large globular pieces of wood were supposed to be the primary stage of their manufacture. One dish figured by Le Mire is here reproduced, and shows a neat handle (No. 15). There were also wooden mallets perforated for a handle. Three bits of a bow, one showing the tip with a notch for the string. An axle-tree for a waggon Le Mire considers interesting, as showing a knowledge and use of traction by wheels.

Besides a few stone celts and chisels, most of which were still in their horn handles, there were a few flint knives (No. 1), three sharpening stones, two curious and novel objects of polished stone, one of which is illustrated (No. 10).

The pottery includes 140 fragments of dishes, showing various forms of handles and linear ornamentation.

Of bronze there are just two objects, a small awl or chisel and a much-worn dagger (Nos. 11 and 12).

Animal bones collected to the amount of 150 kilogrammes were not reported on by a skilled person; but, according to Le Mire, they belonged chiefly to the ox, stag, boar and pig; among them was a fine specimen of a bear's skull. Among other organic remains were a few grains of wheat and acorns.

MARSH DWELLING IN THE TOWN OF BORDEAUX.

In 1867 Mr. Delfortrie (B. 136) published a notice of prehistoric antiquities of the Neolithic Age found in the course of excavations for the improvement of the town of Bordeaux, which point to the existence of some kind of marsh dwelling in the very centre of the town. Attention was first directed to the matter by the quantity of bones thrown up from the lower part of the excavations, among which Delfortrie detected some worked ones, and associated with them were various stone and flint implements.

In regard to the osseous remains, he observes that the lower jaws of ruminants, which were relatively in great abundance, had their incisor teeth purposely removed, but the molars were retained. On the other hand, the upper jaws were entirely absent or broken, like all other marrow bones.

At three different points forming an almost equilateral triangle of 200 mètres the side, he procured sections of these street cuttings, in all of which the succession of strata and relics indicated similar conditions. At one point he gives the following details of a section:—

	Mètres.
A. Earth and subsoil B. Terramare of Gallo-Roman period	4·
C. Marine bed with shells	·10
D. Sandy peat	·50
E. Bed of ashes with oyster shells, worked bones, etc.	·50
F. Lacustrine sand	·45
G. Black peat with sand and gravel	1·55
	7·10

The bones represented the following animals:—Great ox, smaller ox, stag, pig, wild boar, horse (a small kind), goat, sheep, and dog. Mr. Delfortrie thinks the bones of the horse show that the animal was not domesticated. No piles were discovered except in the Gallo-Roman period. The following shells were found in the marine bed C.:—Ostrea edulis, Pecten maximus, Mytilus edulis, Venus decussata, Cardium edule, Mactrea solida, Turbo neritoides, and Trochus cinerarius.

The relics were found chiefly in bed E., among the ashes, a few being from the sandy peat above it. These consist of pointers, needles, polishers, spatulæ, arrow-points, and an implement of bone called a whistle; flint saws, a polished celt also of flint, three small polished stone celts of serpentine or quartzite, and about a dozen flint knives.

The opinion of the narrator is that there was here a marsh dwelling of the nature of the Kökkenmödings of Denmark which in point of time preceded the Swiss lake-dwellings, but was posterior to the Reindeer Period of Central France.

In my opinion, the character and finish of the relics furnish no grounds for supposing that this habitation was prior to the early Swiss lake-dwellings; nor are we warranted, from such limited explorations as could be made in the streets of a town, to exclude the more probable idea that this was an ordinary palafitte, notwithstanding that piles were not observed.

Second Lecture.

SETTLEMENTS IN EASTERN SWITZERLAND, THE DANUBIAN VALLEY, AND CARNIOLA.

THE remains of lake-dwellings which I have hitherto described were, with one or two exceptions, situated on the borders of large lakes, and the industrial remains recovered from them were found more or less buried in the lake sediment. But these are not the invariable circumstances in which such antiquities are met with, as has already been noticed in the case of Wauwyl; but their differentiating points I did not then discuss, reserving them for this special occasion.

Every careful observer of natural phenomena must have noticed how, under certain well-defined conditions, the superficial areas of lakes are becoming gradually encroached upon, not only by the accumulation of *débris* carried into them by streams and rainwash, but by the growth of peat on their margins. This latter process occurs more frequently in the smaller lakes—so much so that some of them have now almost entirely disappeared owing to the complete filling up of their basins. Though the growth of peat is slow, and almost imperceptible to individual observers, whose lifetime is generally too short to mark its progressive character, it has proved a most formidable antagonist to lake settlements by destroying their lacustrine character, and thus compelling their inhabitants to abandon them altogether. The peat has, in some instances, actually engulfed entire villages, with the accumulated *débris* of their industrial equipments, thus hermetically sealing up everything in one of the best antidotes to natural decay. Cities and mighty empires have risen, flourished, and disappeared, without transmitting to future ages a single record of their existence, like flowers born to blush unseen. Such, indeed, might have been the fate of many of these pile-villages, notwithstanding the favourable conditions in which their ruins have been sealed up, had it not been for the mere accident of peat-cutting, which has disclosed so many of their buried treasures. These remarks are peculiarly applicable to the celebrated settlement at Robenhausen, with which I begin to-day's lecture.

LAKE OF PFÄFFIKON.

The small lake of Pfäffikon, which lies to the east of Lake Zürich, contained two settlements, viz. Robenhausen and Irgenhausen.

Robenhausen.—This well-known station, which has furnished specimens of lake-dwelling remains to most of the European museums, is situated near the middle of an extensive tract of pasture-land on the south side of the lake. Although its site is now several hundred yards from the lake, there can be no doubt that, originally, it was completely surrounded by water; the nearest land, that on the west, being some 2,000 yards distant. On the east side the old lake-shore is 3,000 yards distant, and towards this, notwithstanding its greater distance, there extended a gangway, the remains of which can still be traced. Underneath the grass there is a thick deposit of peat, which has been utilised as fuel according to the needs of the surrounding community; and a mere glance at the locality shows that the whole expanse is but an encroachment of the peat on what was formerly part of the lake. The meadow belongs to peasant proprietors, among whom it is parcelled into small plots. During the winter of 1857–8 Mr. Jacob Messikommer, the owner of one of these plots, discovered the remains of a pile-dwelling on his portion, and to its investigation he has ever since devoted himself. His efforts were greatly encouraged by Dr. Keller and other members of the Antiquarian Society at Zürich, to whose museum many of the principal relics have been sent. A few years after its discovery, the project of deepening and widening the outlet, which, as it so happened, passed through the lake-dwelling, afforded a splendid opportunity to archæologists for investigating its antiquarian remains. Messikommer was appointed superintendent of the proposed excavations. Since then he has on several occasions when the waters were low, as in the years 1864, 1865, 1870, 1875, 1882, 1884, and 1886, made more or less extensive diggings in different parts of the settlement for the purpose of clearing up obscure or disputed points. Altogether he has made good use of his advantages, and to his intelligent and watchful care we are indebted for a careful record of the relics, as well as a series of shrewd observations bearing on the character and duration of this settlement, which has made it one of the most instructive in the whole range of lacustrine research.

The space occupied by the settlement formed an irregular quadrangle, little short of three acres in extent. The piles were made from the round or split stems of trees—oak, beech, and pine being the prevailing kinds. On the supposition that they were placed at uniform distances throughout, Messikommer calculates from the data supplied by the Aabach Canal, which involved an area of about 4,000 square feet, that 100,000 piles were required for the construction of the entire lake-village.

In order to get at the relics, one has to dig through 5 or 6 feet of peat, in which no relics are found, with the exception of the piles, the tops of which nearly reach to the surface. Such pits are soon filled with water, as all the relic-beds are below the level of the lake.

As the excavations progressed, Messikommer made the important observation that the piles could be distinguished into three sets, corresponding with so many relic-beds.

The first set of piles penetrated into the shell marl some 10 or 11 feet below the present surface; and immediately over this marl there was a bed of greasy peat only 4 or 5 inches thick containing a few relics. Then followed a bed of charcoal with carbonised wheat, barley, cloth, etc., the result, according to our investigator, of a general conflagration which destroyed the entire settlement. After this catastrophe a new superstructure was reared, the piles of which were so closely set that, on an average three or four could be counted in each square foot. This new village appears to have flourished for a long time, as its duration is represented by a peaty deposit nearly 3 feet thick containing a variety of relics, as bones, pottery, portions of clay flooring, etc. Then followed a second bed of burnt materials, as corn, fruits, bread, and the usual industrial implements of stone—all of which point to a second conflagration. But, apparently undiscouraged, the lake-dwellers again undertook the task of reconstructing their peculiar dwellings, and Messikommer distinguishes this third series of piles by their not penetrating so deeply as those of the previous habitations. While the piles of the earlier dwellings penetrated into the shell marl, those of the third structure fell short of the former by 2½ feet and terminated in the intervening accumulated *débris.* On the other hand, however, their tops reached higher in the peat, coming nearly to the present surface. Further, he observed that it was only in the third settlement that the piles were split, those of the two former being round and much more decayed. Also, corresponding to its duration, there was a deposit of peat 3 feet in depth containing various relics, but no evidence of a conflagration, and above this point the peat was entirely destitute of the remains of human industry. It would thus appear that the lake-dwellers voluntarily abandoned their village, either on account of the accumulation of peat or because, in the exigencies of civilisation, they found more congenial conditions of habitation elsewhere.

During the excavations in the Aabach canal the above facts were amply demonstrated, as, indeed, they can be at the present time by any one who chooses to make the necessary excavations, permission for which the proprietor freely gives.

From the peculiar grouping and distribution of the relics over certain areas Mr. Messikommer came to the conclusion that while each cottage had its special appliances, as a hearth, a millstone, sharpening stones, and weaving materials, there were other relics specially localised. Thus there were large quantities of corn in one place, dried fruits in another, flax in a third, etc. He also learned to recognise from the kind of litter used, and the droppings of the animals, where the stalls for cattle, sheep, and goats were located; which, according to him, were in the intervals between the cottages. Bones, scales of fish, dried fruits, water-chestnuts, beech and hazel-nuts, acorns, and other remains of food, were very abundantly met with. The following are some of the more interesting relics from this vast deposit of the industrial remains of many ages:—

Wooden Objects.—A bow of yew, five feet long, still retaining the notch at both ends for the string; another specimen measures only 3½ feet in length. A large tub-like dish, nearly 16 inches in diameter, and a variety of ladles. A yoke for cattle, made of a hazel branch. A large door of wood, so arranged as to turn on a pivot, and measuring 4 feet 9 inches by 2½ feet wide, and 1½ inch thick; a canoe 12 feet long, 2½ feet wide, and 5 inches deep; a large assortment of handles, knives (**Fig. 24,** No. 15), clubs (No. 26), dishes, suspension hooks, etc.

Horn and Bone.—Haftings for stone axes and chisels (Nos. 8 and 9), daggers, chisels, perforated axe-hammers (No. 12), arrow-points (No. 2), agricultural implements, small cup (No. 7), etc.

Stone.—Axes of nephrite are scarce, but they are abundant of the ordinary materials (No. 23)—some are perforated; flint saws in their handles, hammer-stones (No. 10), pendants (No. 3), a stone disc polished and perforated in the centre with a round hole (No. 13), arrow-points and scrapers of flint (No. 1), two small objects of redstone perforated with a series of holes (Nos. 5 and 6).

Pottery.—Earthenware cups, spoons, and various kinds of vessels (Nos. 14, 16, 17, and 18). Particularly noteworthy is one with a conical base requiring a ring-support (No. 18). Several coarse crucibles with handles (No. 22). When the first of these objects was discovered, it was supposed to be a large spoon, but latterly traces of copper were found in the pores of one, and thus their true nature was recognised. These crucibles were found a few years after the discovery of the lake-dwelling, and although Messikommer was constantly on the look-out for metal objects it was not till 1882 that his search was rewarded. This was a small copper celt of the flat type (No. 4), but as it was in stuff thrown out of the trenches for some time, it was impossible to say to which settlement it belonged. (B. 383, p. 324.) In 1884 Messikommer announced that a crucible which had evidently been used was found in the stratum of *débris* corresponding with the second settlement at Robenhausen.*

On the 4th of October, 1887 (B. 454), Mr. H. Messikommer, while making excavations in an undisturbed part of this lake-dwelling, found near the surface of the peat, and on a level with the tops of the piles, another hatchet of the flat type made of bronze (No. 11). It is clear from these respective finds that the Robenhausen lake-dwelling came to an end before bronze came into general use.

Weaving Materials.—A great many specimens of flax, yarn ropes, balls of thread, bits of ribbon, and variously-woven cloths, fishing and hair nets,† plaited borders, fringes, and mats (**Fig. 25**). Loom-weights (**Fig. 24,** Nos. 20 and 21) and clay pirns were also met with, but, singularly enough, hardly any spindle-whorls. It is not very

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* *Das Ausland*, 1884, p. 479; *Antiqua*, 1884, p. 70.

† *Antiqua*, 1885, p. 1.

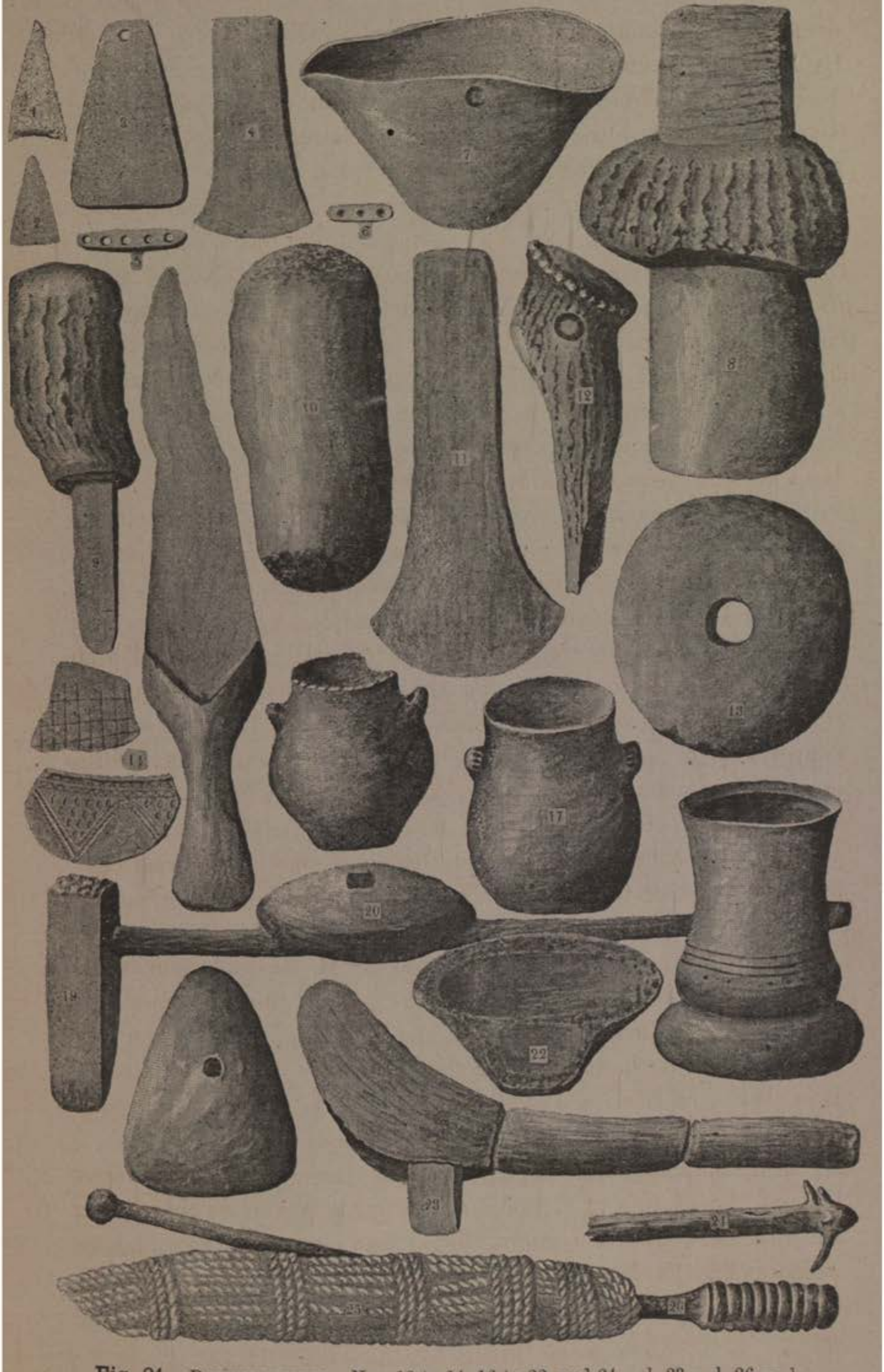
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Fig. 24.—Robenhausen. Nos. 12 to 14, 16 to 22, and 24 = $\frac{1}{4}$, 23 = $\frac{1}{8}$, 26 = $\frac{1}{10}$, and the rest = $\frac{1}{2}$ real size.

clear in what position these recorded relics have been found; but in 1882, when the water happened to be very low, the lowest relic-bed was carefully searched, and similar remains were found in it. In consequence of these finds, Messikommer announced, in 1882 (B. 383a, p. 379), that he was convinced that all manner of weaving was thoroughly known at the very commencement of the Robenhausen lake-dwelling.

The third settlement has yielded very little cloth or thread, probably owing to the fact that no conflagration took place, by the charring of which such remains are preserved from decomposition. On the other hand, jade implements, among which is an arrow-head of nephrite, and some 60 seeds, and fruits, have been collected. Among the latter the water-chestnut (*Trapa natans*) may be especially noted, as it no longer grows in the locality. (B. 462.)

IRGENHAUSEN.—Only one other settlement has been recognised as a true lake-dwelling in this lake-basin, viz. Irgenhausen, situated about half an hour's walk to the east of Robenhausen. The station ran parallel to the shore for a distance of about 300 feet, with a breadth of only 30 feet. The relics found on it are similar in character to those from Robenhausen, the most remarkable of which are specimens of embroidered cloth and checked muslins. (B. 126, Pl. xvi. Fig. 2 and 2a.) Messikommer believes that only one row of cottages occupied this site. Almost the whole site of this lake-dwelling has disappeared into the depths since 1881, and can no longer be found.* Only a yawning deep (*eine gähnende Tiefe*) is now to be seen where formerly stood the remains of the Pfahlbau. This phenomenon is, however, not singular in the Swiss lakes, as evidence of which we have the recent catastrophe in Lake Zug, which demolished not only the site of a pre-historic lake-dwelling, but also a large part of the town of Zug.

Close to the water's edge on the south shore, and about ten minutes' walk directly north of Robenhausen, there is an artificial mound called Himmereich, which formerly was supposed to be the site of a pile-dwelling. It is constructed of small and large stones, among which flint saws, arrow-points, and pottery of the lake-dwelling type, were found associated with Roman tiles and pottery (*terra sigillata*). There were, however, no piles or any evidence of structural dwellings, and the opinion

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* *Corr.-Blatt*, vol. xv. p. 55.

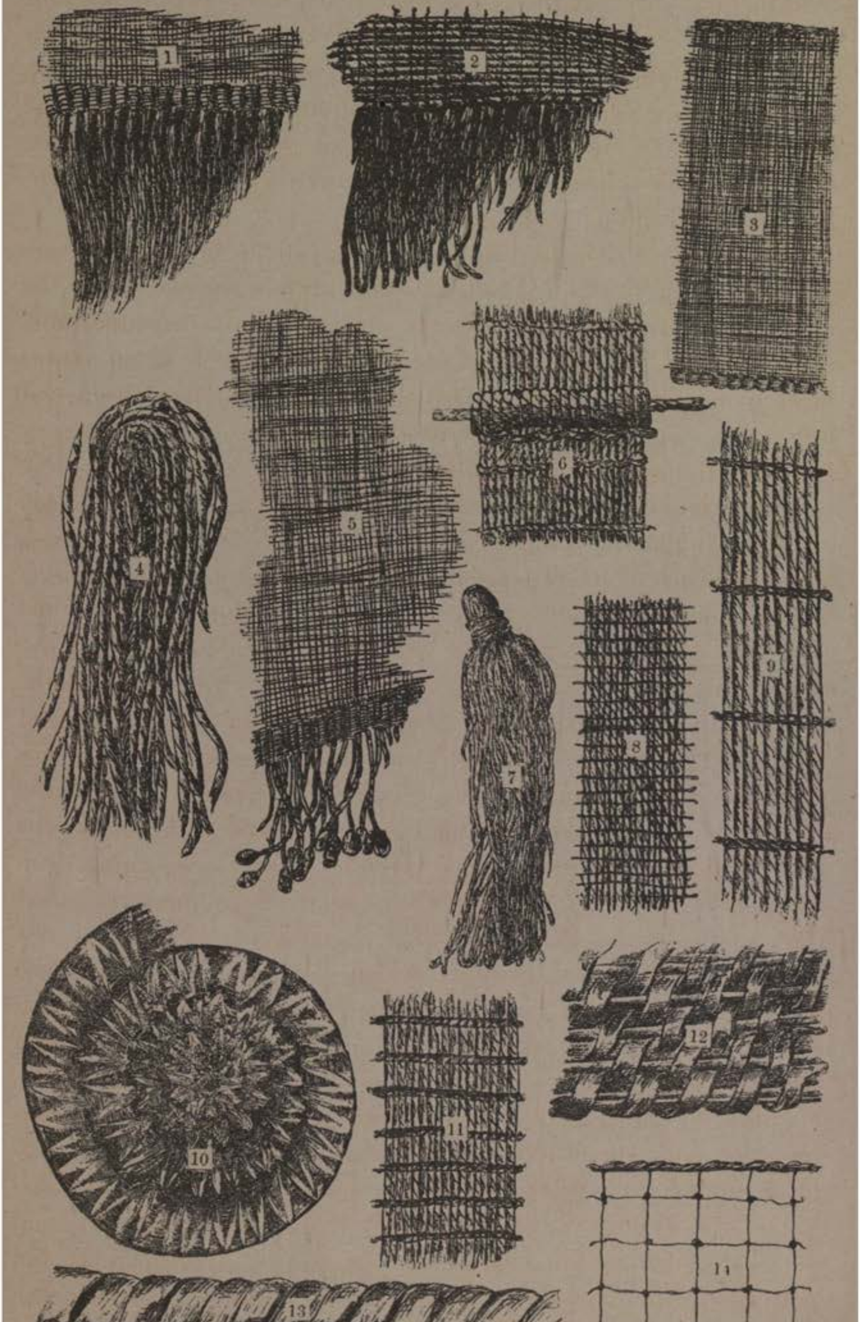
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Fig. 25.—Robenhausen. All $\frac{2}{3}$ real size.

now generally held in regard to it is that it was a pre-Roman Refugium, which subsequently fell into the hands of the Romans.* Remains of a Roman station are also close to Irgenhausen, which might have something to do with the Himmereich mound. (B. 462.)

The records of the numerous discoveries made at Robenhausen from time to time, according to the favourableness of the weather, are, like the relics themselves, widely scattered. In addition to the reports of Keller and J. Messikommer (B. 22, 34, 40, 61, 126, 336, and 462) in the proceedings of the Society of Antiquaries of Zürich, we have a number of further notices in various journals, such as *Anzeiger*, *Antiqua*, *Das Ausland*, etc. (B. 143a and 143b, 154, 256, 383, 385a and 385b, 402, 403, 406c and 406d 434c, 449b, 454b, etc.), from which more or less important information is to be gleaned.

EGELSEE, NEAR FRAUENFIELD.

NIEDERWYL.—The settlement of Niederwyl was situated in a small basin covering only about 60 acres, which, though now entirely overgrown with peat, must have been formerly a lake, as its ancient name Egelsee implies. Immediately to the south there is an open valley, from which it is separated by a narrow ridge of land, through which its proprietors made a deep excavation for its better drainage, thereby facilitating the removal of the peat. While the peasants were thus occupied, they came upon a portion of the basin near its centre, where the peat began to thin out; and as they advanced, it turned out that there was something like a mound entirely submerged in the peat, and composed of clay, wooden beams, stones, charcoal, and all sorts of rubbish. On the centre of this mound the depth of peat was only 2 or 3 feet, while all around it amounted to 8 or 10 feet. This curious elevation was simply passed over by the workmen after removing its covering of peat; and so it remained exposed, till one day the Reverend Mr. Pupikofer happened to pass along the moor, when he recognised its archæological importance. This was in 1862, and immediately the Historical Society of Thurgau arranged to have the matter investigated; and Mr. Jacob Messikommer, whose experience of the lake-dwelling at Robenhausen had made him an authority on such matters, was asked to conduct the necessary researches. Upon making sections through the exposed part of this mound, he found an artificial sub-structure of faggot-sticks, laid transversely, and mixed with upright piles which penetrated to the original lake-bottom. It was fortunate, however, that the whole of the mound had not been bared of peat, and Messikommer wisely selected an undisturbed portion for his subsequent excavations. The following quotation from his report will convey a better idea of these structures than any abstract I could make:—

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* *Antiqua*, 1884, p. 140.

"When I began the excavation with a few workmen on the 18th of June, I was surprised to find, under a pavement of clay and gravel, from 2 to 4 inches thick, and from the top of which 3 feet of peat had been removed, a structure of faggot-sticks, regularly laid and perfectly solid; and as the wood was exceedingly soft, we had to use every care in uncovering as large a portion of it as we could. We first bared a space, which was in perfect condition, 20 feet long, 6 feet wide at the ends, and 10 feet wide in the middle. The upper platform was of split timber or boards of oak, laid down with great care, and it rested on round timber, or faggot-sticks, from 3 to 4 inches in diameter, which were surrounded with piles. The back part of the space was covered with charcoal, and was somewhat charred; there were also found tolerably large stones (hearthstones) in their original position. A most striking fact was that the lowest part of the side wall was still standing; it consisted of a kind of shutter pushed in between the upright piles surrounding the space. On this I had other portions uncovered, and everywhere met with the same construction, only differing in having the platform or floor made of faggot-sticks instead of boards. Here and there the floor had sunk considerably, often one or one inch and a half in six inches.

"This place was then left to be examined by the members of the associations of Thurgau and Zürich, and excavations were made in another place to examine the sub-structure. The result proved no less interesting; for 1 foot deep, under the first platform, we came upon a second; a foot deeper we found a third; then a fourth, and so on; so that the arrangement is similar to that of Wauwyl. The huts were placed on masses of wood, consisting of five or six platforms, one above the other, the spaces between which were filled in with brushwood and branches of trees, chiefly alder, rushes, gravel, and clay. We were surprised to meet with bones, cones of earthenware, and a great wooden mallet between the platforms; we also found woven cloth under the fifth platform, and charcoal close to the bed of the lake. From this I conclude that the platforms were not made at the same time, but at intervals, one after the other; or that they had been repaired, a portion at a time, as we found single charred stems under fresh wood." (B. 119, 2nd ed., p. 77.)

In another section Messikommer observed a slight variation in the fascine structures above described, which he thus explains: "What I have called the lattice or trellis work consisted of thin stems of trees, which were not laid close together, but at intervals of from one to two inches apart; the uppermost stems rested on others lying under them at right angles, and these again on others parallel with those on the upper layer. The spaces between the timbers were filled in with charcoal and burnt clay."

Each structure seemed to have been adapted for one cottage, as between them there were narrow spaces which had got filled up with *débris*, and contained relics such as broken stone hatchets, carbonised cloth and fruits, etc.

"We cannot imagine," continues Messikommer, "that this settlement was destroyed by fire, for although we occasionally met with burnt beams, not a single trace of conflagration was to be seen in the upright piles, which projected as much as 2½ feet above the floor—nay, even in most of them the bark was still in good preservation.

"The products of the potter's art were in general very coarse, and yet we found a few fragments which had been ornamented, and also parts of the rims of vessels made with washed or purified clay, and without quartz grains. Fragments of vessels also were found neatly polished, blackened, and with handles of a convenient form. No smaller implements were met with, such as pins, little chisels, etc. It is very singular that so few bones were found; the cow, stag, and the pig were the only animals the remains of which were discovered here.

"At the bottom of some broken earthenware vessels there still remained grains of wheat and barley and hazel-nuts. Doubtless all the food, whether animal or vegetable, was kept in large or small vessels of earthenware."

Subsequently, on two occasions, Messikommer was asked by archæological societies to give a practical exposition of this interesting *Packwerkbau* for the edification of their members—once in 1872, when the meeting of the Swiss Natural History Society was held at Frauenfield; and again in 1877, when the German Anthropological Association met at Constance. (B. 406c.)

On all these occasions Messikommer paid particular attention to the size and kind of cottages the lake-dwellers possessed. In 1862, from the stumps of piles protruding through a portion of undisturbed flooring, he estimated the size of the habitable area for each cottage at 24 feet long by 18 feet broad. On these floorings were seen the remains of food and industry, just as fresh as it the people had recently left the place. ("Die Mühle mit Gerste und Weizen daneben, als wäre sie erst gestern noch bewohnt gewesen.") He believes that each cottage possessed not only its own domestic utensils but also its weaving and corn-grinding machines, etc.

The area occupied by the entire settlement was 20,000 square feet, and the nearest shore, when the basin was a lake, would be 30 or 40 yards distant.

The industrial remains collected from time to time at Niederwyl consist of:—Wheat, barley, flax, cakes of bread, wooden implements, clay weights (**Fig. 26,** No. 3), stone hatchets (Nos. 7 and 8), flint saws (No. 1) and scrapers; some well-made dishes (Nos. 4, 5 and 6), one a remarkable jug (No. 6) with handle; another, of black earthenware, had been mended with asphalt. A strip of birch-bark (now in the Museum at Zürich) had been neatly sewn (No. 10). In the same Museum there is a stone (perforated) axe-hammer head which vies in elegance of workmanship with any from Scandinavia (No. 9).

Recently Messikommer has come to the conclusion that the *Packwerkbau* at Niederwyl existed during the early Bronze Age, as he found a piece of oak wood having cuts which could not have been made by a stone implement. From various considerations of the more recent facts brought to light in the course of his frequent excavations here and at Robenhausen he enunciates the opinion that wherever split oak beams or piles are found we may with certainty conclude that the settlement belongs to the early metal age. ("Man darf mit Bestimmtheit annehmen, dass alle jene Niederlassungen, in welchen gespaltenes

Eichenholz in grösserer Menge zum Vorschein kommt, auch das Metall in einfacher [Kupfer] oder zusammengesetzter Form [Bronze] gekannt haben.") (B. 454c, p. 2.)

Second Station.—Adjacent to the Egelsee basin, and separated from it only by about a dozen paces, is another small peat-basin known as the Riedsee, in which were recently found the remains of a true pile-dwelling. Here for some time fragments of pottery, stone hatchets, horns and bones of various animals, were met with in the peat; but in August, 1884, Messikommer discovered the actual piles associated with the usual objects of a Stone Age

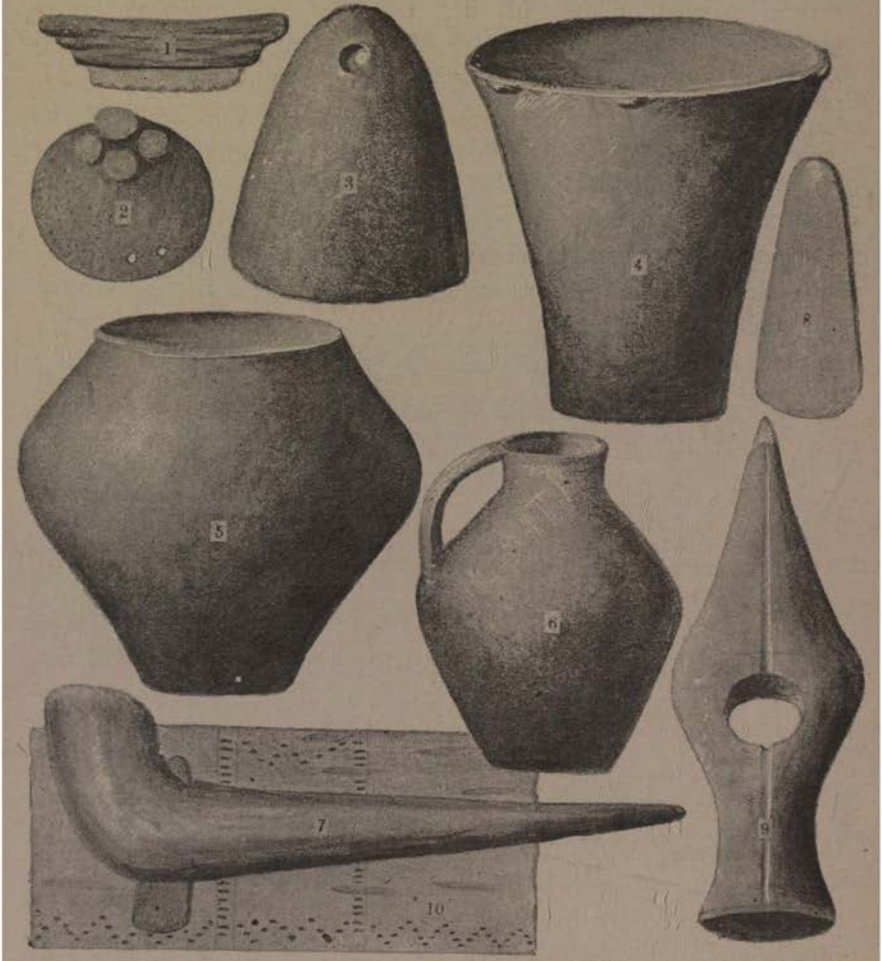


Fig. 26.—NIEDERWYL. Nos. 5 to 7 = $\frac{1}{6}$, 10 = $\frac{2}{3}$, and the rest = $\frac{1}{3}$ real size.

dwelling. The area of this Pfahlbau was small, measuring only 13 yards by 10. Its site lay near the margin of the peat, and the antiquities were met with 1 foot under the surface. Among these were a small earthenware dish or cover ornamented with four prominences and a few rows of punctured dots (No. 2), several wooden dishes in all stages of manufacture, entire handles of stone hatchets, worked horn, etc. A crucible similar to those from Robenhausen was also found near the same place.

Among the osseous remains are portions of a skull of the urus with both horn-cores attached. The other animals represented are the bison, stag, ox, pig, goat, etc. (B. 420d.)

GREIFENSEE.

During the winter of 1865–6, when the water was low, Messikommer recognised the site of a pile-dwelling in the Greifensee, near Riedikon, but it has proved of little importance, as only a few objects—some flints and stone celts, fragments of pottery, shells of hazel-nuts, and some grains of barley—were found. Its site was covered with broken stones, and being about 100 feet from the shore, in a depth of 3 or 4 feet even when the water was low, it was difficult to make a satisfactory examination. (B. 126, p. 308.)

Traces of a second station are said to have been observed between Riedikon and the village of Greifensee, near where the Aabach enters the lake. (B. 462.)

HEIMENLACHEN.

Near the village of Heimenlachen, in the Canton of Thurgau, there is a peat-moor covering about 15 acres, in which the peasants while cutting peat were occasionally turning up objects of human industry deeply buried, but they have been either dispersed among the curious or thrown away. A large skull of an ox, supposed to be that of a urus, lay for years exposed among a heap of rubbish, but when subsequently searched for, it could not be found. Among these relics were celts of nephrite, stone hammers, various articles of bone and horn, and some fragments of pottery and basket-work. Mr. Burkhard Raeber, of Weinfelden, drew attention to these current reports, and made some excavations in the moor, in the course of which he discovered numerous piles and some transverse beams which he considered to have belonged to a platform.

Another site in the same moor was discovered in 1875, which yielded similar evidence of a pile-dwelling. The woodwork was not encountered till 4 feet of peat had been removed. Mr. Raeber calculates that the settlement was from 80 to 100 yards in length. (B. 182a, 199, and 336.)

KRÄHENRIED, NEAR KALTENBRUNNEN IN THURGAU.

Mr. Raeber found evidence of the existence of a pile settlement in a peat bog at Krähenried. Here the relic-bed was 5 or 6 feet deep, and contained remains of piles, charcoal, hazel-nuts, fragments of pottery, and a well-made celt of serpentine. The ornamentation on the pottery consisted in many cases of regular rows of dots impressed on a fine quality of paste with a smooth surface. The peat-cutters assured Mr. Raeber that similar objects had been frequently found by them, but, considering them of no value, they were thrown away. (B. 288.)

LAKE OF NUSSBAUMEN.

In an open valley between Stein and Frauenfield there is a chain of three small lakes, the upper of which goes by the name of Nussbaumen. Here there is an artificial island, on which Mr. Morlot had observed piles and other indications of a lake-dwelling, but the matter has never been thoroughly investigated. According to Morlot, this island measures 110 feet by 60 feet, is surrounded by piles, and has a similar appearance to that in the little lake at Inkwyl. (B. 31, p. 84.)

LAKE OF CONSTANCE.

The district around the Lake of Constance appears to have had great attractions for the early lake-settlers. This predilection was no doubt due to the exceptionably favourable conditions which the lake afforded for the construction of their pile-villages, viz. a gently-sloping lake-bottom, with a wide tract of grazing or agricultural land beyond. In every sheltered bay around the Untersee, Ueberlingersee, and lower parts of the Bodensee, traces of these settlements have been found; but owing to the difficulties and expense of investigation they have not yet yielded their due quota of relics.

WANGEN.—The first discovered was that at Wangen. It is recorded that Mr. Caspar Löhle, after reading Keller's first report of the Pfahlbauten, recollected having seen on the shore near his own house similar antiquities to those figured from Ober-Meilen. He then commenced, in the autumn of 1856, to collect them; and when the water was low he made excavations, which by degrees rewarded him with some remarkable remains of human industry. The station was in a small bay to the east of the village, in front of a considerable extent of flat land which intervened between it and the sunny slopes beyond. This bay, owing to its sheltered position, was subject to an unusual deposition of lake sediment, so that in the course of time the *débris* of the settlement became covered over with 3 or 4 feet of mud and gravel. As this deposition went on, from year to year, the bed of the lake became gradually raised, and the water was displaced, so that at certain seasons, when the water in the lake was very low, the relic-bed of the settlement could be investigated by digging on dry land.

Mr. Löhle, in the course of his extensive excavations, ascertained that the settlement extended in the form of a parallelogram some 700 paces in length and 120 in breadth. The piles were made of round or split stems of various kinds of wood, as oak, beech, elm, birch, ash, fir, elder, maple, and two species of willow. They were thickly placed, sometimes three or four together, and Mr. Löhle calculates that in the entire settlement 40,000 or 50,000 must have been used. The relics collected were very numerous, but they are widely dispersed. The best public collections that I have seen are in the Museums at Zürich, Constance, and Sigmaringen. The following notes and accompanying illustrations (**Fig. 27**) will give a fair idea of their character.

Stone.—Celts, hammer-stones, grain-rubbers, etc., were in hundreds, and in all stages of manufacture, but the great majority were badly made. Perforated tools were comparatively rare (Nos. 7, 8, 9, and 20). Flint saws hafted in wood (No. 15), and flint arrow-heads and lance-heads, were in tolerable abundance (Nos. 1, 2, and 3). The celts and chisels were made from the ordinary water-worn materials found in the neighbourhood (Nos. 6 and 10), and only a few small specimens were of nephrite and jadeite. Very few had horn fasteners, and the prevalent method of using these implements was to insert the celt into a cleft in a branch with a long handle and a crook at the other end. Slabs for grinding and polishing these celts, as well as others with marks of fire, and supposed to have been used as hearths, were also frequently met with.

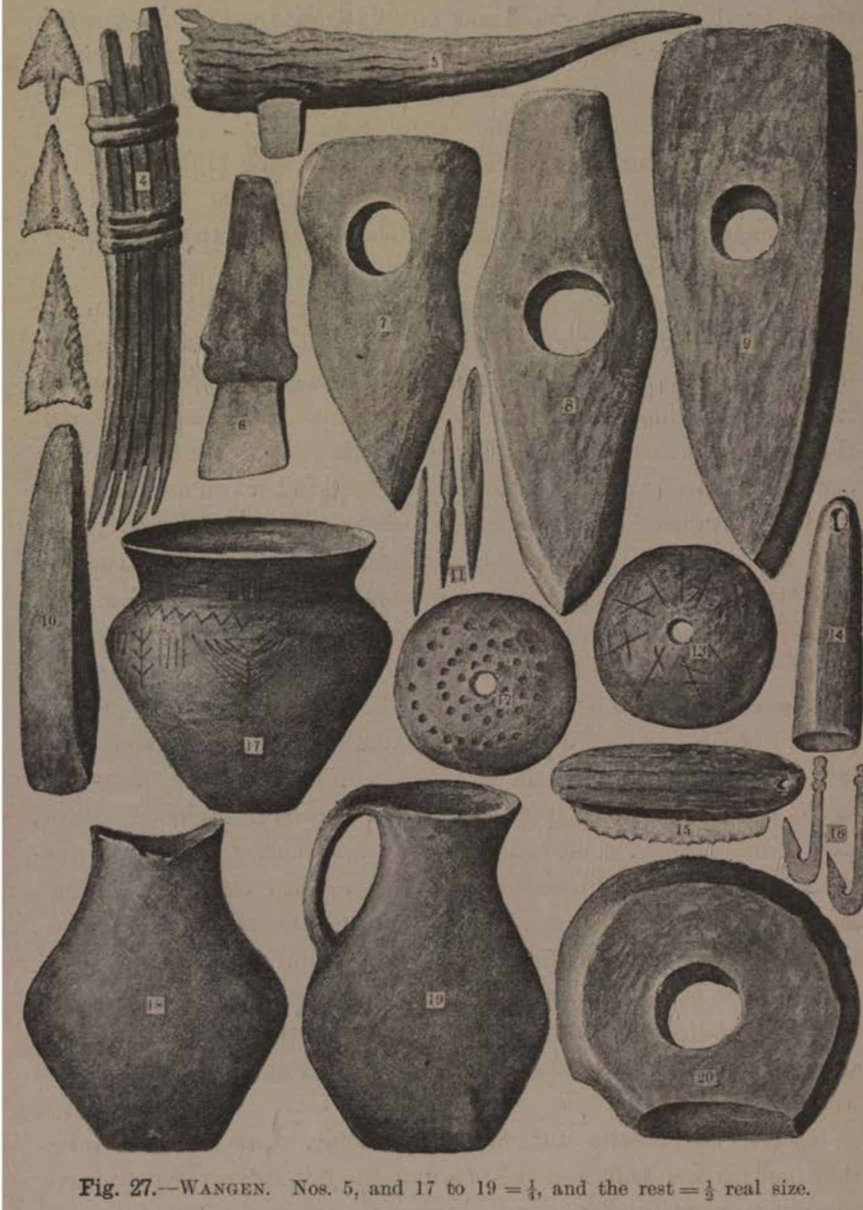


Fig. 27.—Wangen. Nos. 5, and 17 to 19 = ¼, and the rest = ½ real size.

Bone and Horn.—Pointers, daggers, awls, small chisels, and arrow-points were found in large numbers. Some of the bone arrow-heads had still the asphalt adhering to them by which they were fastened to the stems. Also flax-hecklers (No. 4), and a variety of fish-hooks (Nos. 11 and 16).

Clay.—The fragments of pottery indicated dishes of a plain shape, generally cylindrical, and rarely ornamented, but smeared over with a black sooty substance (Nos. 17, 18, and 19). Spindle-whorls of burnt clay (Nos. 12 and 13), and large clay balls, perforated, probably loom-weights.

Wood.—A plank of oak 7 or 8 feet long and 1½ foot wide is supposed to have been a working bench. Another board, also of oak, was like a round table, and measured 2½ feet in diameter and 2½ inches thick.

Organic Remains.—The most remarkable feature, however, of the settlement at Wangen was the quantity of charred corn dug up from its *débris*. Mr. Löhle believes that altogether, and at various times, he has collected as much as 100 bushels. Sometimes he found the entire ears, at other times the grain only; but always in a charred condition. The two-rowed barley and two kinds of wheat could be readily identified. Cakes of bread showing roughly-crushed grain, wild apples and pears—all, of course, in a charred condition, otherwise they would not have been preserved from decomposition. In some places there were large quantities of the husks of pine-cones, apple-cores, beech and hazel-nuts, as well as the seeds of raspberries and brambles. From the quantity of apple-cores found in one place it has been suggested that the lake-dwellers made some kind of liquor of fruits. Flax in all stages of manufacture, from the crude bundles of stems with the seed-vessels still attached, to the yarn, and a variety of beautifully-woven cloth. Quantities of moss, rushes, bark of trees, straw, etc., were also collected. These antiquities were not promiscuously all over the area of the settlement, but each group had a well-defined area for itself, from which Mr. Löhle inferred that the different trades were kept apart.

Bones were not numerous, but among them the following animals are represented:—Urus, aurochs, stag, roe, wild boar, wolf, fox, and dog.

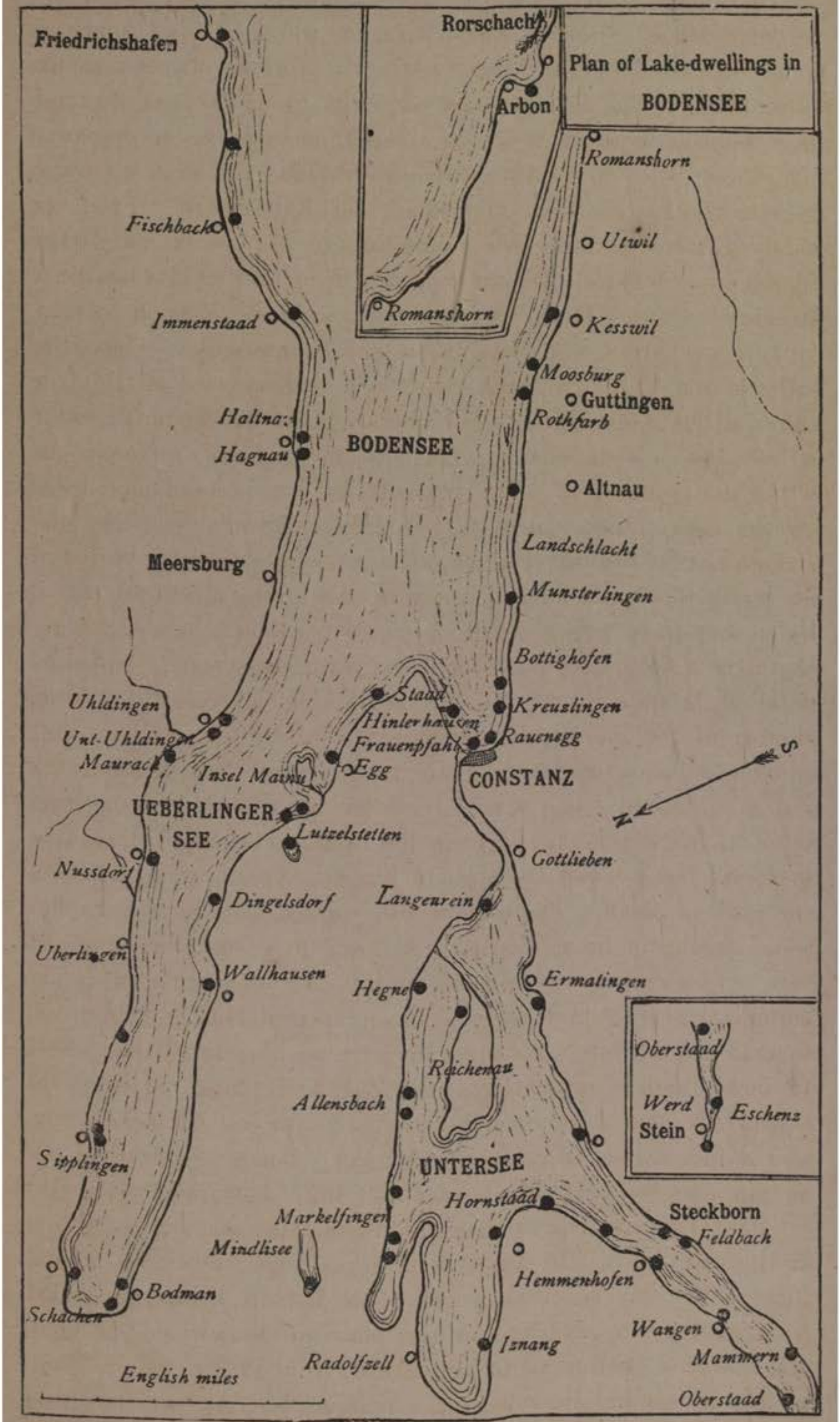
In one part of the settlement Mr. Löhle observed some piles that had become bent and twisted like the letter S, evidently from superincumbent pressure; and in these places some additional piles had been inserted by way of support.

No metal objects were found, nor any support-rings of clay, nor discoidal stones. (B. 22, 34, 35, and 40.)

OBERSTAAD.—Starting from Wangen, we shall now make a circuit of the Untersee, briefly noting its various stations as we move along. The number now amounts to upwards of 20, and their respective positions can be ascertained from the accompanying Sketch Map (page 129). Below Wangen, the first we come to is in the bay between Oberstaad and Kattenhorn. From its widely scattered remains this station appears to have extended over a large area; but its piles are sparingly seen, and its site has been little investigated. The relics found are a few stone celts and pottery.

HOF BEI STEIN.—A little below the bridge which crosses the outlet of the Rhine at Stein there is a shallow part of the river known as "Auf dem Hof," which on rare occasions, when the water is low, becomes exposed. This was the case on two occasions within the memory of persons now living, viz. in 1858 and 1883. On the last of these dates Mr. B. Schenk, naturalist, of Stein, discovered that it contained the remains of a pile-dwelling buried in the mud. The piles in this structure were strong and firmly fixed, and among them were some transverse beams, and others slantingly placed, as if to protect the structure against the stream. Notwithstanding the difficulty of working here, Mr. Schenk collected a large number of the industrial remains of its inhabitants, such as flint implements, about 150 stone axes (three of which were of nephrite), and a perforated stone disc like a large spindle-whorl, measuring 2¾ inches in diameter, and 1½ inches thick. Perforated stone axes were rare, but some of them are of interest, especially a portion of one made of basalt. There were also worked objects of horn and bone, remains of linen cloth, thread, and a woven fabric made of bast. Noteworthy among bone objects is the scapula of a deer perforated with a round hole, and having its central ridge rubbed off, so as to make it into a polishing implement. An urn-shaped vessel 12 inches high is preserved in the Zürich Museum. A few metal objects are also recorded, viz. a small copper celt 2¾ inches long, also a bronze ring and a bronze hatchet. Bones representing the ox, pig, stag, roe, bear, and beaver. (B. 462; *Antiqua*, 1883, p. 68.)

DAS WEERD.—The existence of the remains of a lake-dwelling at the east end of the Insel Weerd has been known for a long time. The site is close to where a Roman bridge extended from Eschenz to Arach; but the piles are somewhat scattered, and embrace both sides of the river. In 1882 Mr. Schenk succeeded in finding its relic-bed, which he describes as composed


Plan of Lake-dwellings in
BODENSEE
Friedrichshafen
Rorschach
Arbon
Romanshorn
Romanshorn
Fischbach
Utwil
Immenstaad
Kesswil
Moosburg
Guttingen
Rothfarb
Haltnau
Hagnau
BODENSEE
Altnau
Landschlacht
Meersburg
Munsterlingen
Bottighofen
Uhldingen
Staad
Kreuzlingen
Hinterhausen
Unt-Uhldingen
Frauenpfahl
Rauenegg
Maurach
Insel Mainau
Egg
CONSTANZ
S
N
UEBERLINGER
SEE
Lutzelstetten
Nussdorf
Gottlieben
Dingelsdorf
Langenrein
Uberlingen
Wallhausen
Ermatingen
Hegne
Oberstaad
Reichenau
Werd
Eschenz
Stein
Allensbach
Sipplingen
UNTERSEE
Hornstaad
Steckborn
Markelfingen
Feldbach
Mindlisee
Hemmenhofen
Bodman
Schachen
Wangen
Iznang
Radolfzell
Mammern
English miles
Oberstaad

of two distinct layers—the upper one being of a dark colour probably the result of the conflagration which destroyed the settlement; and a lower of a yellowish colour, containing much organic *débris*. About 4 cubic mètres of this *Kulturgeschicht* was examined, and among the relics collected were three human skulls, one of which is perfect, but the others were in bits; a knife, a hair-pin, and some rings of bronze; a copper celt (B. 420b, p. 174); polished stone celts, one of which was made of jadeite. In addition to these, there were various objects of Roman times collected on or in the vicinity of this station, including a tile with an inscription, a bronze statue, Roman coins, etc. In the Rosgarten Museum there is a bronze sword, said to be from this station; also a quern stone 21 inches in diameter, with a central hole 3 inches in diameter. But it is not probable that either of these objects really belonged to the lake-dwellers. The bronze knife, three pins, and some perforated stone implements (**Fig. 28**, Nos. 4 to 7, and 10), are also in this museum, and labelled "Insel Weerd." The human skull has been reported on by Professor Kollmann, who shows it to be dolicho-cephalic. (*Antiqua*, 1883, p. 69; and 1884, p. 174; *Das Ausland*, 1885, p. 219; B. 462.)

MAMMERN.—In the bay above Mammern, at a place called Neuenburgerhorn, there is an extensive area containing very decayed piles. It was investigated by Messikommer in 1861 on behalf of the Historical Society of Thurgau. (B. 41.) The piles commenced about 160 feet from the shore, and extended some 400 feet along, covering an area of 40,000 square feet. The antiquities were all found on the surface, and consisted of hundreds of stone celts, flint implements, pottery, and bones. No small bone tools, nor any trace of the lighter industrial remains or food material, were met with, nor was there a relic-bed underneath. Hence Messikommer concluded that the finer contents of the relic-bed had been washed away by the current of water, which, it seems, is pretty strong at this place. (B. 40, p. 26.)

FELDBACH and STECKBORN. — A station called "Pfahlbau Turgi," near Feldbach, has been long known, and several prehistoric objects have been found on it from time to time. The water being low in 1882, the Historical Society of Thurgau undertook some systematic explorations. From various indications it was inferred that this station was not among those destroyed by fire. The antiquities collected belonged to the pure Stone Age, among which are:—Stone celts, bone and horn objects, specimens of barley and wheat, cloth made of bast, and fragments of basket-work. From the observations of Mr. Schenk, it would appear that this pile-dwelling had been protected from the waves by a kind of wooden bulwark. (B. 383a.)

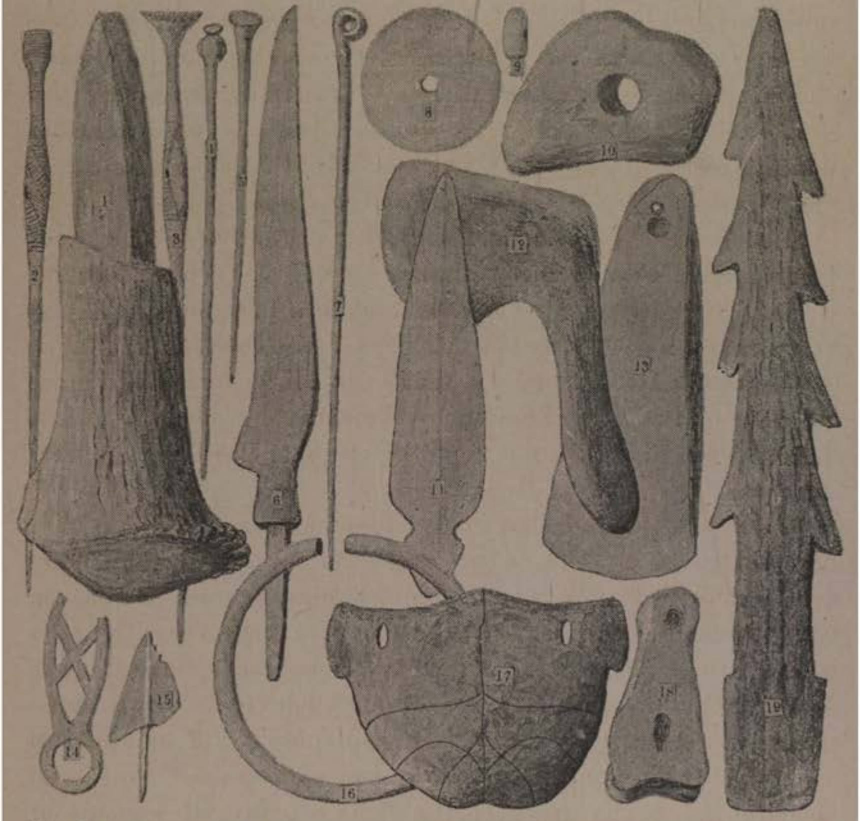


Fig. 28.—UNTERSEE (1, 4 to 7, 13, 16, 18, and 19), MINDLISEE (2, 3, 11, 12, 14, and 15), and BUSSENSEE. Nos. 10 and 12 = ¼, and the rest = ½ real size.

Near Steckborn there was another small station, known as "Der Pfahlbau Schanz," on which some interesting objects—as dishes, harpoons, etc.—were found. In 1885 it was again searched by Messikommer (B. 434b, p. 33), and among the objects then collected were stone celts (**Fig. 28,** No. 13), harpoons of horn (No. 19), a flax-heckler, and an implement called a whistle (No. 18) made of the short foot-bone of a cow. According to Messikommer, this settlement had been twice destroyed by fire and the usual carbonised materials—as cloth, grain, charcoal, etc. —were abundantly found. (B. 462.)

BERLINGEN.—In the bay above this town are piles, but not readily discernible, and stone celts have been found all along the shore.

ERMATINGEN.—This settlement occupied the bay below the village, and its site is particularly rich in flint implements and the refuse of their manufacture. Stone celts are also abundant, and among them are a few of nephrite. Some fragments of pottery showing a net-like ornamentation on their inside are noted from this locality. The station appears to have been voluntarily abandoned, as there are no carbonised materials among its *débris*. (B. 40 and 462.)

LANGENRAIN.—Below Gottlieben, at the north end of a small island formed by a divergent branch of the Rhine, Dr. Nägeli, of Ermatingen, discovered in 1882 the remains of a pile-dwelling of the Bronze Age. Some of the piles were seen in the water projecting from the mud, but they are mostly concealed by the deposits imported by a stream (Wollmatinger-Bach) which here falls into the Rhine. They are partly round and partly split stems, sharpened by metal tools, and occupy an area about 100 yards in length and 15 in breadth. The relic-bed was covered with a layer of mud from 1 to 2½ feet in thickness. Among the objects recorded from this station are a winged celt, two lance-heads, and two hair-pins of bronze, fragments of pottery (some of which are ornamented with the meander pattern), and two bits of clay crescents. Also various bones of animals and portions of a human skull, the latter being found in the presence of Mr. Leiner at a depth of 2½ feet from the surface. (B. 462.)

OBERZELL.—The first station on the island of Reichenau, and only lately discovered, lies to the north of Oberzell. (B. 462.)

HEGNE, ALLENSBACH, and MARKELFINGEN.—Of the settlements along this part of the shore Mr. Dehoff has given a long account in Keller's fifth report of the Pfahlbauten. (B. 61.) Since then a new station has been discovered at Hegne, but otherwise no important discoveries have been recorded from these stations. They all belong to the Stone Age. At Markelfingen the piles were observed round a small steinberg some 30 paces from the shore, which, when the water was low, became a low island. No piles were seen on this island, but it yielded a large number of coarsely-made stone celts. From this place I noticed in the Museum at Friedrichshafen a beautiful polished chisel of stone in a staghorn handle (**Fig. 28**, No. 1) and a metal (copper or bronze) bracelet (No. 16).

Near Allensbach piles extended as a broad band for about 1,000 paces parallel to the shore. In one place rows of piles took the direction of the shore in such a manner as to suggest a bridge or stage entrance. The piles were generally round stems, but some of the oak ones were split, and measured in some instances 14 to 16 inches in diameter. They projected only a few inches above the mud. In some places horizontal beams of split oak were found lying buried in the mud, but in deep water, and measuring 15 feet in length and 4 to 6 inches in diameter.

The antiquities collected were chiefly the heavier implements, as stone celts, which varied very much both in size and form—being from less than an inch to 21 inches in length. Only a few fragments showed perforated axes. Corn-crushers were in great abundance, as well as flint saws and other objects of this material. Another station just opposite Allensbach has largely supplied collectors with stone celts, and a considerable number of perforated hammer-axes. At Hegne the stone celts show better workmanship, and among the relics are some beautifully-made saws, daggers, and lance-heads of yellow and dark flint. Two earthen vessels slightly bulging in the middle, and having perforations for cords instead of handles, are noted by Dehoff as containing a black sooty substance, and a third was filled with hazel-nuts.

The remaining stations in the Untersee are at IZNANG, GUNDOLZEN, (B. 462, p. 12), HORNSTAAD, GAIENHOFEN, and HEMMENHOFEN, but they present the same features as those already noticed of the Stone Age. (B. 22.)

CONSTANCE.—In the Bay of Constance there were several of these lake-dwellings, the remains of which have only more recently come to light. In Keller's eighth report of the Swiss lake-dwellings (B. 336), Mr. Leiner, keeper of the Rosgarten Museum, gives a short account of the antiquities found in the harbour (Rauenegg) when it was being enlarged. Among several rows of ancient piles of oak and cross-beams running in a southerly direction towards the Kreuzlingen shore there were found buried in the mud, chiefly lying over the shell mail (*überkalkter Conchylien*), fragments of ornamented pottery (**Fig. 29,** Nos. 4 to 10), loom-weights, spindle-whorls, portions of clay plaster for huts, stone celts, and perforated axe-hammers, together with a variety of flint implements (Nos. 11 and 12). Mr. Leiner remarks that while the pottery found in many of the neighbouring stations was rude and entirely hand-made, that from the Rauenegg station would almost indicate a knowledge of the potter's wheel. This pottery was burnt into a grey, black, or yellowish colour, and belonged to the Bronze Age; in proof of which he instances among the antiquities a few bronze objects (Nos. 1 to 3), a small bit of amber, and some fragments of a fine green and blue glass. One of the bronze objects (No. 1) is quite unique, but of its purpose nothing seems to be known.

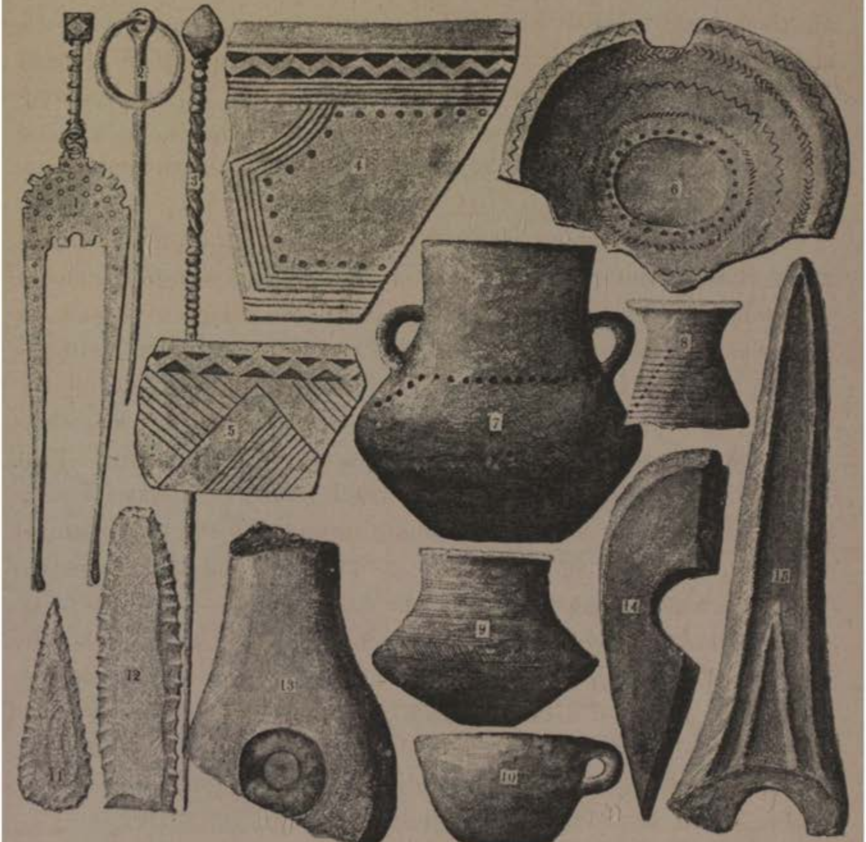


Fig. 29.—Bay of Constance. Nos. 6 to 10 = $\frac{1}{4}$, and the rest = $\frac{1}{2}$ real size.

In 1882 the site of a station was discovered just opposite the public gardens, which goes under the name FRAUENPFAHL. Its area was determined to be about 130 yards long and 100 yards wide. The antiquities from it are hatchets of serpentine and chloromelanite, fragments of vases, a large bead of blue glass, a bronze hatchet, and a canoe.

During the same season (the water being then very low) another large station was discovered, running along the north shore of the bay near HINTERHAUSEN. It extended in length for about 400 yards, with an average breadth of 50; and among its piles were found some hundreds of stone hatchets, worked objects of bone and horn, pottery, and a large assortment of the bones of various animals. (B. 381, 382, and 462.)

In passing to the *Ueberlingersee* the first station we come to is Staad, which lies immediately below Allmannsdorf; and a little farther on there is another, opposite the village of EGG, both of which are recent additions to the long list of lake-settlements known in this branch of the Lake of Constance. Beyond the bridge which joins INSEL MAINAU to the mainland lies the *débris* of a very large settlement which formed at least two villages. That next to LÜTZELSTETTEN is characterised by its high-class pottery of the Stone Age. Along the shore stone celts are met with all the way to the village of DINGELSDORF, immediately opposite to which is a settlement of the Stone Age.

The next station was near WALLHAUSEN, which, owing to the number of flint implements collected on it, goes among collectors under the name of "Flint Island." Among the celts found here are a few of nephrite and one of polished flint. (B. 462, p. 4.) Large collections have been made from this station, one of which, according to Mr. Böll, was lately sold for £60. (B. 378.)

From Wallhausen northwards neither piles nor any industrial remains are met with till we come to Bodmann. This is, no doubt, owing to the abrupt nature of the coast which renders the lake-margin unsuitable for such structures.

BODMANN.—At this town the hills again recede, and leave an open valley stretching away westwards, through which the stream *Stockach* flows and empties itself into the head of the lake. Here there were two settlements which have yielded an enormous amount of industrial remains. The most recent haul was in 1888, the largest portion of which went to the Rosgarten Museum. When I last visited Constance (August, 1888), the stuff was still at Mr. Leiner's private residence, and it was perfectly appalling to see the number of boxes, barrels, etc., in which the materials were stowed away. Besides the Rosgarten Museum, there are good collections from these stations at Friedrichshafen, the Steinhaus Museum at Ueberlingen, and at Bodmann itself (formerly in the Schloss, but now at the private residence of Mr. Ley).

The results of the earlier explorations have been described by MM. Ley and Dehoff (B. 61 and 126), and some notes of the more recent finds are given by Leiner and Böll. (B. 378, 381, and 382.)

The first station was close to the present landing-stage, and the piles have been observed to hug the shore in a narrow band for several hundred yards. In one spot measuring some 30 yards by 10, flint implements and refuse, including all manner of chips, were found in such astonishing quantity as to give rise to the opinion that it was the site of a flint factory. Mr. Dehoff states that so numerous were the flints here that, before the introduction of lucifer matches, and as far as the memory of man goes back, it supplied the whole neighbourhood with the flints required, and was actually worked as a business for this purpose. Mr. Ley describes the relic-bed as consisting of two strata, separated by a thin layer of mud, and buried beneath a bed of gravel 1¼ to 2 feet thick. The lower stratum was from half a foot to a foot thick, and lay immediately over the original lake-sediment. In some parts this layer appeared to be covered by a thin deposit of carbonised materials.

The second relic-bed was but half the thickness of the former, and, according to Mr. Ley, it was only in it that perforated axe-heads were found; and in its other remains, such as pottery, he sees evidence of progress and improved handicraft.

Among the more noteworthy objects from Bodmann (**Fig. 30**) are fish-spears of horn, with two and four prongs (Nos. 3 and 5); fish-hooks and other implements of bone (Nos. 1, 2, 4, 6, 7, 8, 10, 14 and 19); a bow of yew wood; a celt and a sickle of flint; a vessel containing no less than 600 perforated beads of Jura limestone; goblet-like dishes of blackish earthenware with conical bases (No. 21); and curiously-ornamented vases (No. 20); a saw in its casing, supposed to be made of reindeer horn (No. 17); clay spindle-whorls (No. 18). Nos. 7, 8, 14, 15, 17, and 18, are from the recent find.

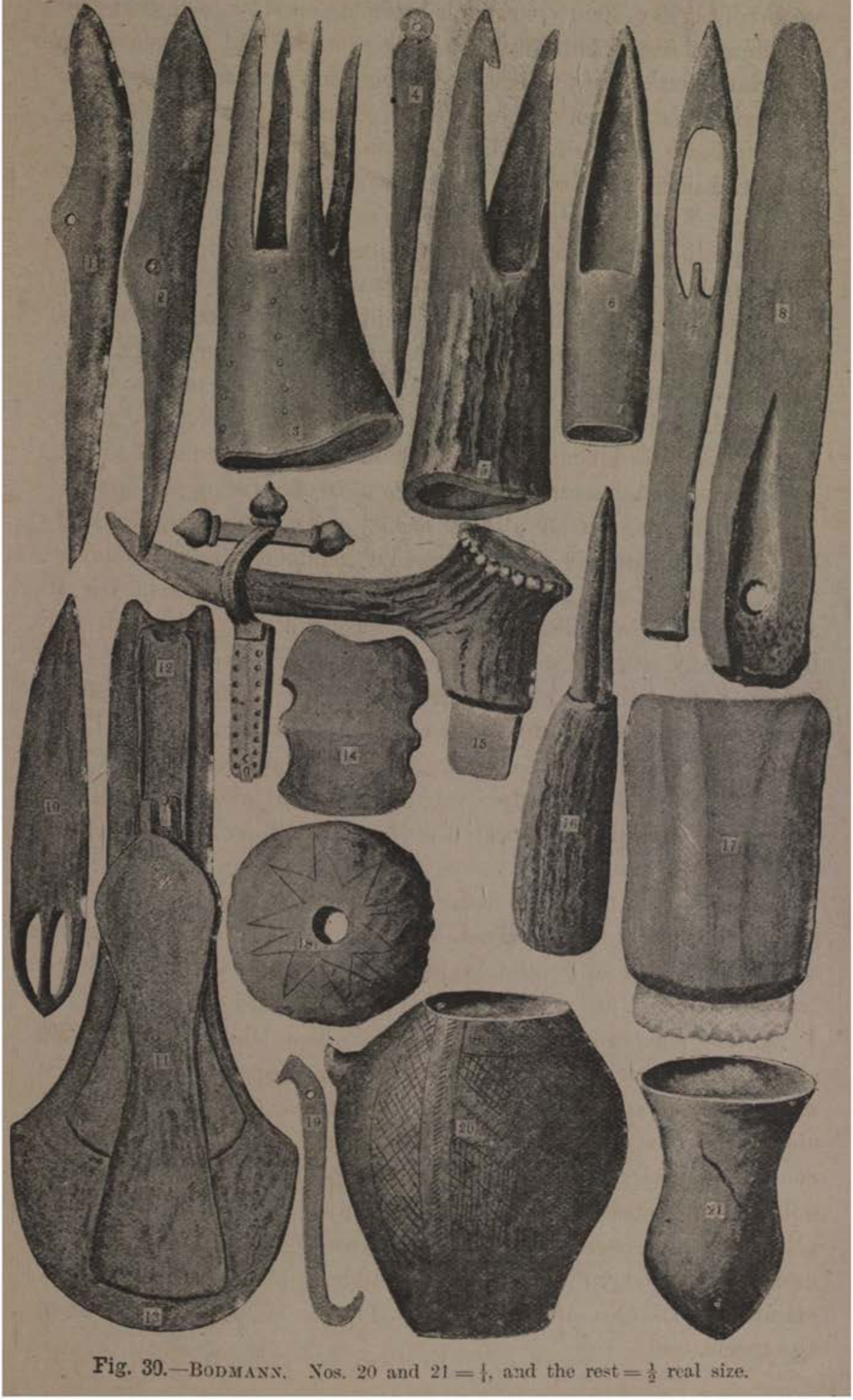

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Fig. 30.—Bodmann. Nos. 20 and 21 = ¼, and the rest = ½ real size.

About 500 or 600 yards farther north, and close to the farthest off point of the Ueberlingersee, Mr. Ley discovered the remains of a second settlement, which he thinks was constructed in the Bronze Age. Not only were bronze and iron objects found on it, but the piles are much less decayed than those of the previously-described station; moreover, there were marks on some he had drawn up from a depth of six feet which could only have been produced by sharp cutting implements. It goes under the name of SCHACHEN; but it is difficult to say from which station the numerous objects exposed in the museums have come, as they are indiscriminately marked "Bodmann." According to Mr. Ley, this settlement was of large extent, but the greater part of it is deeply buried in mud, and not easily explored. The bronze objects described by Mr. Ley are three celts, two of the flat type (Nos. 12 and 13) and one winged (No. 11), and a pin. Those of iron are a knife, two arrow-heads, and portion of a fish-hook. A fibula in Rosgarten Museum marked "Bodmann" is of the Roman period (No. 9), but this is not surprising, as there are many Roman remains in the neighbourhood. Split beams of oak, and others with square mortised holes (like those from Zürich, **Fig. 2,** Nos. 13 and 14) were fished up here, thus bearing out Keller's idea that such beams were only used where the mud is soft. Some elegant vases, one ornamented like those from Schussenried (No. 20), and horn objects, are reported from it. (B. 462.) In the Museum at Ueberlingen there are a few bronze and iron objects from Pfahlbau Bodmann, as a bracelet of bronze wire, pins, needles, a ring, a lance-head, and two small figurines (**Fig. 195,** Nos. 15 and 16).

LUDWIGSHAFEN.—Turning the head of the Ueberlingersee we come to the village of Ludwigshafen, where recently piles have been detected in two places, one of which has turned out to be exceedingly rich in staghorn implements—so much so as to suggest the idea that it was a special factory for this material. This station was about 30 yards from the shore, and in the vicinity of its remains it was long known that Roman tiles lay scattered about. These tiles are of two kinds, hollow and flat, the latter measuring 12 by 7 inches.

SIPPLINGEN.—There are two stations at Sipplingen—one, at the east end of the village, covering nearly 30 acres. The second is only about 4 acres in extent, but it has not been carefully explored. Its chief interest lies in the statement made by

Mr. Böll that a large quantity of wood was observed lying in the mud, and among the beams an iron sword, believed to be of Roman origin, was found. Close to this station was found the wreck of a badly-constructed boat, which had no nails, but was kept together by copper wire. (B. 378, p. 97.) The former station is the more interesting, as it has furnished objects characteristic of the three Ages of Stone, Bronze, and Iron, as well as of Roman, Allemanish, and Frankish times. According to Dr. Lachmann (B. 126), the great majority of the relics belong to the Stone Age, with very few of the Bronze Age. Among the objects of more recent times were the following of iron:—A lance-point, three arrow-heads, two sickles, a one-edged sword, and a Roman key. What is still more puzzling is the finding of glass in considerable quantities here. It is of two kinds, and one bit was ornamented with gold enamel. Among the more recent finds are pottery representing large vessels, with a rim and perforated knobs for suspension, and a large flint celt weighing three pounds. (B. 378.)

Some goblets with conical bases, supposed to be crucibles, have been found here, as well as at Bodmann (**Fig. 30,** No. 21), but they appear to me to indicate the commencement of the Bronze Age when such forms came into general use.

It may be further noted that among these relics are about 100 examples of egg-shaped stones which were found in one place, a few hatchets and chisels of nephrite, and a small copper celt encased, when found, in a clay coating, probably the mould in which it was cast.

Another small station, the *débris* of which is deeply buried, was near St. Catherina, not far from Brünnensbach, which has also yielded objects of more recent times. (B. 462.)

NUSSDORF.—The settlement at Nussdorf covered about three acres in the form of a parallelogram. The piles are mostly round, generally about two feet apart, but sometimes in groups. This station was the first discovered by Mr. Ullersberger, in 1862, and is important for the number of antiquities it has yielded of the pure Stone Age. Dr. Lachmann describes the early investigations and discoveries with great minuteness. (B. 126.) Among the flint objects were about 100 specimens of arrow-points and lance-heads (**Fig. 31,** Nos. 1 to 5), in all gradations of sizes, and 80 saws, piercers, and knives. The saws were in general 3½ inches in length and 2 wide, and eight still retain their handles. Stone celts, chisels, and hammer-axes (No. 20) numbered about 1,000, and of these about 50 celts were made of nephrite. Horn fixings were used for some of the celts; but there were wooden handles with a cleft, which showed that they were hafted in a variety of ways. The perforated axes were comparatively rare, only

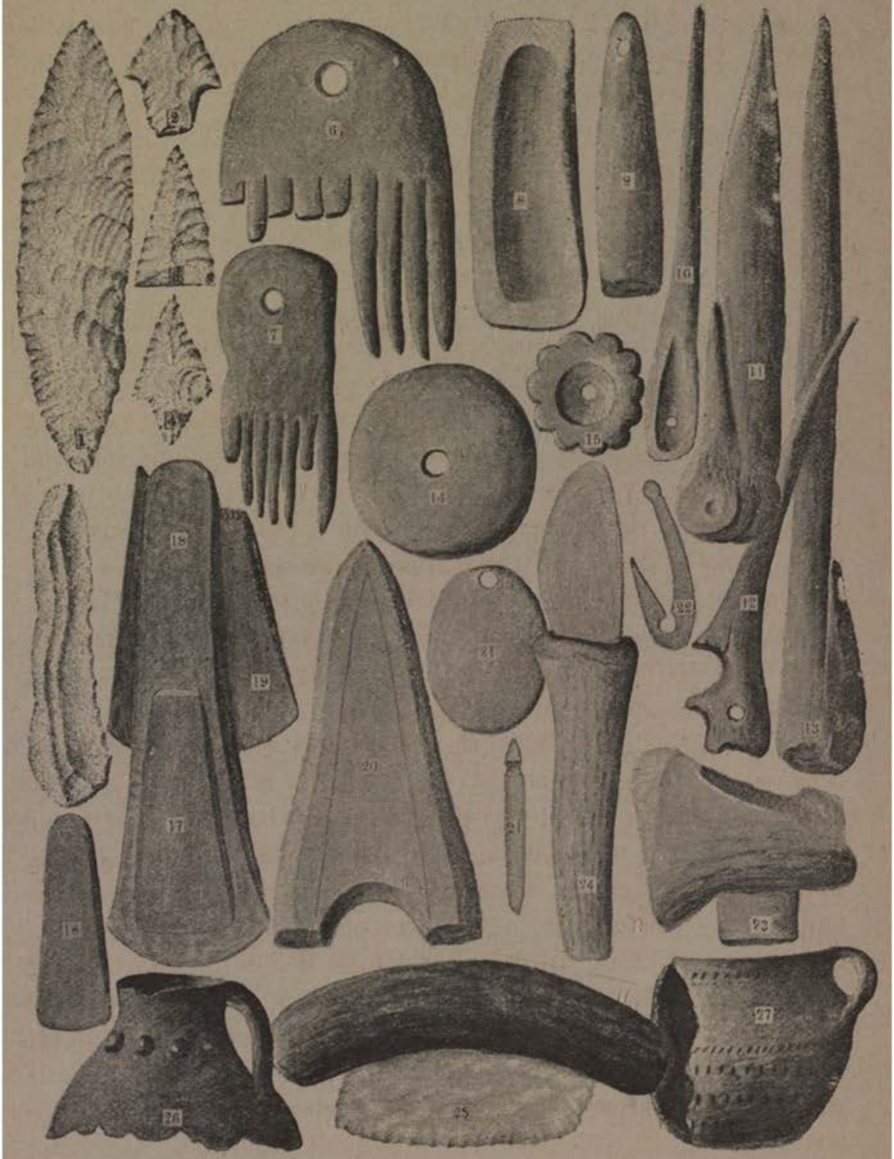
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Fig. 31.—Nussdorf, Maurach, Lützelstetten, etc. No. 24 = $\frac{1}{4}$, 26 and 27 = $\frac{1}{5}$, and the rest = $\frac{1}{2}$ real size.

about 50 being in the collection. The perforations are both circular and oval.

Clay spindle-whorls (Nos. 14 and 15) and loom-weights were well represented, but pottery was both scarce and of indifferent quality. Of bone and horn there were several hundred objects, including chisels (No. 8), awls, daggers (Nos. 11 to 13), various kinds of pins (No. 10), three combs (Nos. 6 and 7), 16 perforated hammers of staghorn (No. 23), perforated teeth, a fish-hook of boar's tusk (No. 22), etc.

MAURACH.—About half-way between Nussdorf and Unter-Uhldingen lies the site of the famous station at Maurach. It was discovered during the winter of 1862–3, and was among those investigated by Mr. Ullersberger. It appears that in 1839 a dam or dyke was built here, which covered a portion of the area occupied by the lake-settlement, so that it could only be partially explored. The piles came close up to the shore, but stretched out into the lake for about 1,000 feet, covering some 8 acres. According to Dr. Lachmann, the antiquities, about 600 of which were collected, were precisely similar to those from Nussdorf. Stone axes were met with in all stages of manufacture, but hardly any pottery. A flattened bead of amber and four copper celts (**Fig. 31,** Nos. 16 to 19) are the only further noteworthy objects included among those from the earlier investigations. (B. 126.)

It was not till 1880, when the dyke above referred to was being repaired, that the special feature which now characterises this settlement became known. Among the stone hatchets then found were nearly 500 of nephrite, of which two-thirds were tolerably well made. But more interesting is the fact that nephrite was found in the crude state, in the form of unworked bits and chips, from the size of a finger-nail up to 3 inches in length and 2 inches in breadth; so that there can be no doubt that this material was worked on the spot. These later finds have gone chiefly to the Rosgarten Museum. Mr. Leiner, writing in 1882 (B. 381), states that from the various stations on the Ueberlingersee he received 800 nephrite, 12 jadeite, 11 chloromelanite, and one saussurite, hatchets or chisels.

UNTER-UHLDINGEN.—Dr. Lachmann describes two settlements which have left their remains near the village of Unter-Uhldingen, about 1,000 feet from the shore and nearly a mile apart, and each covering about 8 to 10 acres. On the other hand, Mr. Böll makes mention of only one station, which he characterises as the largest in Lake Constance, covering some 30 acres. Both stations contained several well-defined steinbergs — three in one and four in the other—in which were cross-beams binding the piles together, like the steinberg at Nidau. The relics belong to all ages, and indicate a continued duration from the Stone Age down to the Roman period, if not even for some centuries later. The Stone Age relics are similar to those found on the other stations in the Ueberlingersee. Dr. Lachmann describes among the flint saws one 9½ inches long. The celts, chisels, and axes numbered about 300, and the spindle-whorls 40. Pottery was more abundantly met with here, and better made, than in any of the other stations. About 130 fragments and whole dishes indicate a great variety of vessels — cups, jars, vases, covers, etc. Some had handles, and others were ornamented in a variety of ways (**Fig. 32,** No. 27); and, besides the Bronze Age pottery, there were bits of red earthenware, the well-known Samian ware (*terra sigillata*) of the Romans.

The special feature, however, of this station lies in the number of bronze objects it has yielded. In the Ullersberger collection Dr. Lachmann describes six lance-points (No. 17); 16 hatchets with wings (Nos. 2 and 3), two with sockets (No. 1), and a few of the flat type (Nos. 29 and 30); 25 knife-blades (Nos. 9 and 12); four armlets, two ornamented (Nos. 21 and 22); some sickles (No. 23), fish-hooks (Nos. 18 and 19), rings, and more than 100 hair-pins (Nos. 4 to 8, 14, 24, and 25). Also about 40 objects of iron, including a few lance (No. 26) and arrow-heads, one axe, several knives, two pruning-hooks (No. 11), some iron rings, a fibula (No. 15), portion of a two-edged sword, a short sword with a wooden handle, an implement like a fork, a pair of pincers, etc. Besides these, there is another collection of similar implements of bronze and iron in the Museum of Friedrichshafen. Among the iron objects here are two of the so-called pruning-knives (Hippen), a hammer-axe, two harpoons, some arrow-heads and rings, a fibula (La Tène type), six horseshoes, a dagger, and a girdle-hook.

Here, as well as at Sipplingen, a quantity of well-made glass was found on the site of the settlement, consisting chiefly of the bottoms of goblets of a greenish colour, which, according to Mr. Hofrath Klemm, of Dresden, belonged to the sixth or seventh century after Christ. Very few objects of bone and horn were found at Unter-Uhldingen.

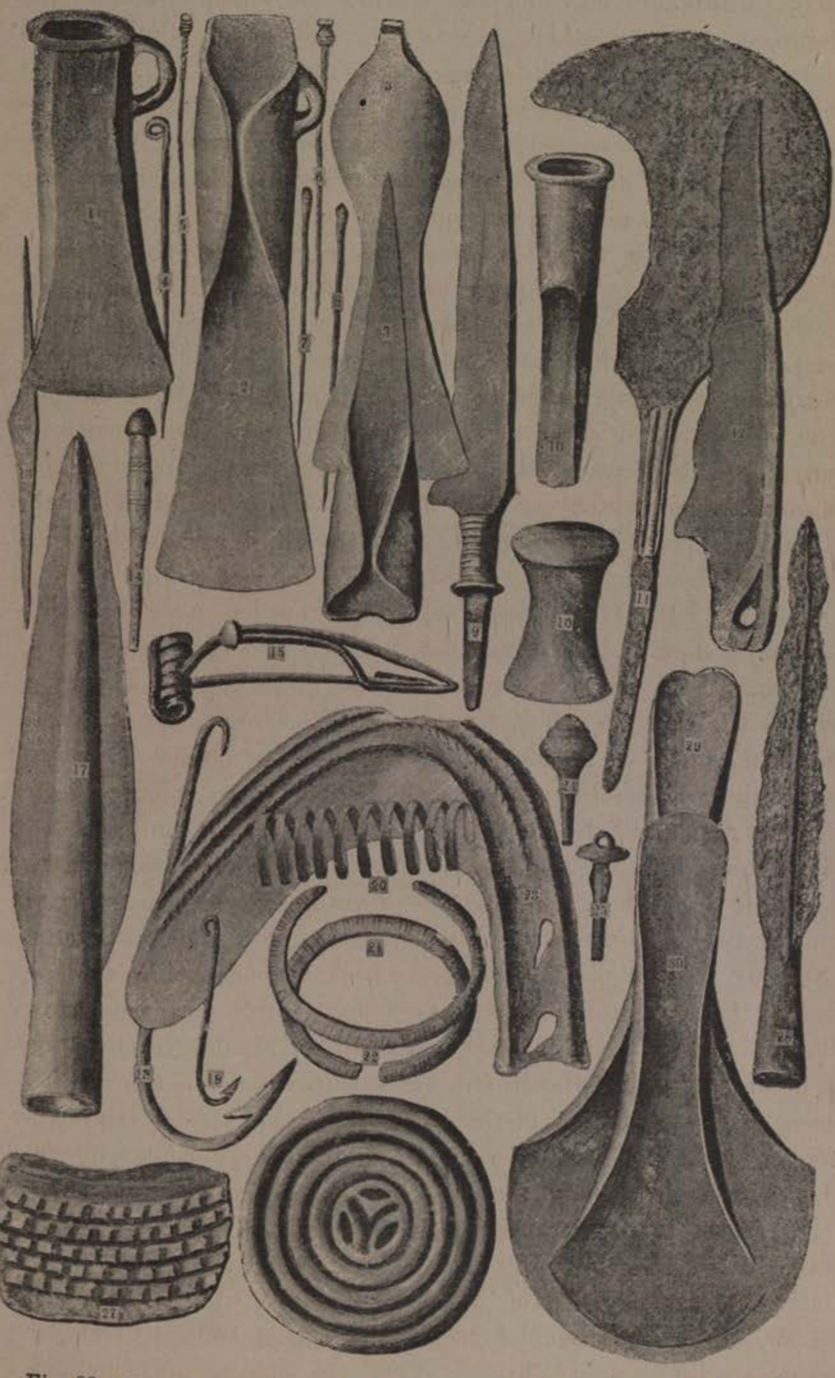
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Fig. 32.—Unter-Uhldingen. Nos. 20 and 26 = ¼, and the rest = ½ real size.

The collection of antiquities from the north shore of the Ueberlingersee, including the settlements Nussdorf, Maurach, Unter-Uhldingen, and Sipplingen, made by Mr. Ullersberger and Dr. Lachmann, previous to 1865, was purchased by the Wurtemburg Government, and is now in the Museum at Stuttgart. Since then a considerable number of objects have been found, which are dispersed among the local museums and private collections, as may be seen from an inspection of the Museums at Constance, Ueberlingen, Friedrichshafen, Bregenz, and Bodmann.

Leaving the northern branch of the Lake of Constance, and still following the coast, we come, a little beyond Meersburg, to a couple of stations, Haltnau and Hagnau, both of which subsisted during the early Bronze Age. From HALTNAU a considerable number of mixed relics, including a bronze spearhead and hatchet, two large vases, beautiful stone chisels and perforated axes, implements of nephrite, etc. (B. 378.) In the Rosgarten Museum there are a few things of bronze, as a knife, a small chisel or awl, like **Fig. 32,** No. 13, a flat hatchet (**Fig. 33,** No. 3), and a pendant (No. 13). Of late years HAGNAU has yielded a large number of bronze objects, including knives (No. 9), sickles, spirals, bracelets (No. 6), flat hatchets (Nos. 1, 2, and 4), two with wings, also pendants, lance-heads, portion of sword-blade, and about 200 hair-pins (Nos. 7, 8, and 10). (B. 381 and 462.) The few illustrations of these objects here given are from the Museums of Constance and Friedrichshafen. The stations at IMMENSTAAD, FISCHBACH, and MANZELL are rich in good specimens of jade. From Manzell comes one of the finest chloromelanite hatchets found in this neighbourhood, and also a small one of jadeite, both of which are in the Museum at Friedrichshafen.

Near Lindau, between the Villa Amsee and Aeschbach, there appears to have been a settlement, from which a few relics have gone to the Museums at Munich and Bregenz. (B. 462.)

The stations along the southern shore of the Bodensee have not as yet been so productive in industrial remains as those of the more sheltered Untersee and Ueberlingersee, but nevertheless there is sufficient evidence to show that they existed along the coast, as will be seen from the following list of their sites, which are successively met with between Rorschach and the town of Constance, viz. ARBON, ROMANSHORN, KESSWIL, MOOSBURG, and Rothfarb near Güttingen, Altnau, Landschlacht, Münsterlingen, Bottighofen, and Kreuzlingen. With the exception of the station at Arbon, the remains of these settlements consist of more or fewer piles, and a sprinkling of stone and flint implements. The shore from Kreuzlingen to Constance was found in 1882 to be continuously studded with piles, and among them a large number of relics was picked up, including several implements of nephrite and jadeite, an amber bead, and a large flint hatchet. (B. 462.) The two fragments of stone axes, Nos. 14 and 15, illustrated on **Fig. 29,** are from this part of the lake.

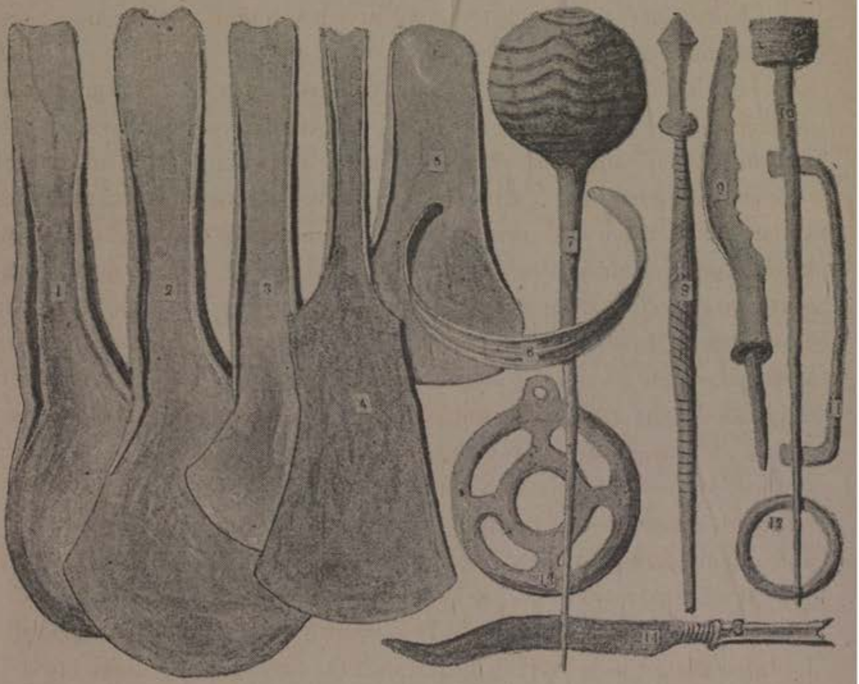

Fig. 33.—Haltnau (3, 5, and 13), and Hagnau. No. 14 = ¼, the rest = ½ real size.

Bleiche-Arbon.—In 1885 Messikommer relates that during the very low state of the lake in 1882 he was requested to visit Arbon, and make an inquiry regarding the discovery of some pre-historic implements along the shore, which were supposed to indicate the existence of a lake-dwelling in the neighbourhood. In the places referred to he found some flint saws and other implements, but, notwithstanding his well-known experience in lake-dwelling research, he failed to find piles; and the only result of his visit was the discovery of the ruins of a Roman watch-tower near the mouth of the harbour.

On the 19th of September, 1885, Messikommer again received a message from the authorities of Arbon to repair to their town, as this time there could be no doubt that the remains of a true Pfahlbau had been found. The site of this new discovery was not the sea-shore, but the flat land stretching between Arbon and Steinach. Here, in the course of excavations for a water supply to the town, the workmen came upon piles with cross-timbers, among which were interspersed various relics of human industry. The place where these discoveries were made was about a kilomètre from Arbon, and close by the road to St. Gallen. On a section being exposed, the following layers were observed:—First half a foot of soil, then a foot of loam, and under this a stratified deposit of sand and gravel, about 3 feet in thickness, containing fresh-water shells. The relic-bed was from 1 foot to 1½ foot thick, and in it were found stone hatchets; fragments of sawn stones, apparently the refuse of manufactured implements; corn-crushers; four perforated horn hammers, "*Feldhacken;*" several bone objects—needles, chisels, awls, daggers; a knife-like implement made of a wild boar's tusk, and another made of yew-wood; an oar; fragments of ornamented pottery, etc. Also there were barley, numerous seeds and fruits, shells of hazel-nuts, the skull of a dog, and a quantity of osseous remains, representing the urus, bison, stag, cow, pig, bear, etc. (B. 431, 434c, and 462.)

MINDLISEE AND BUSSENSEE.

In the vicinity of Constance are two small lakes or bogs which have yielded important remains of lake-dwellings. These are the BUSSENSEE and MINDLISEE, both situated in the tract of country stretching between the Untersee and the Ueberlingersee. The former is near Lützelstetten, and in its marginal peat there have been found the following antiquities:—A wooden dish cut out of an alder-trunk, measuring 13 inches in diameter; two amber beads—one a perforated disc 1½ inch in diameter (**Fig. 28,** No. 8), similar to one found at Ober-Meilen, and said to have been in the possession of the late Mr. Aepli, and the other a small ordinary bead (No. 9). Also several articles of stone, horn, copper, and bronze. A curiosity is a portion of the shell of a tortoise perforated with two holes for suspension (No. 17). Also a female human skull of the dolicho-cephalic type.*

The Mindlisee is near Möggingen, and its Pfahlbau is more difficult of investigation, owing to the bogginess of the peat. Some of the antiquities from this locality, and now in the Museum at Constance, consist of fragments of pottery, two ornamented pins and a dagger of copper (Nos. 2, 3 and 11), some bronze objects (Nos. 14 and 15), and a curiously shaped stone, like a hatchet and handle in one piece (No. 12). (B. 381 and 462.)

FEDERSEE.

The settlement in the Federsee was reported on by Oberförster Frank, of Schussenried, in 1876, being the result of systematic investigations conducted by him during the previous year. (B. 285.) It was situated in the south-east corner of an extensive tract of peat which now largely occupies the ancient basin of the Federsee, at a place about three miles distant from the present small lake, and 380 yards from its ancient or glacial margin. Immediately over the glacial *débris* in which this basin is formed there lies a layer of whitish clay, "Weissergrund," about 15 inches thick, and then follows peat for a thickness of 10 or 12 feet. The lake-dwelling remains are met with at a depth of 6½ feet, but it is impossible to form a correct idea of the extent of the entire settlement, as it is only a portion that has been exposed. At this depth in the peat wooden platforms are met with, formed of layers of round or split timbers lying transversely one above the other, and forming a kind of fascine structure. Between the wooden layers there is always placed a bed of clay, the number of which varies from three to eight, so that there is no uniformity in the thickness represented by these structures.

Inserted through these solid masses of clay and wood, at intervals of about 2¼ feet, were upright beams, only some of which reached the Weissergrund. These piles were slender, only about 4 inches in diameter, and showed no evidence of having either mortises or tenons by which they could be joined with the horizontal beams.

Relics were found not only on the surface of these fascine structures, but also in the clay between the successive layers or platforms, and even underneath the lowest, down as far as the

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* *Antiqua*, 1883, p. 14; and *ibid.*, 1885, p. 2.

Weissergrund, but never actually in the latter. Between the lowest layers of woodwork and the Weissergrund there is sometimes a space of 4 or 5 feet in which horns, broken bones, and other relics are found; but it is "above and between the horizontal layers of timbers, and chiefly in the immediate neighbourhood of the upright piles, that implements of all kinds are met with—of flint, stone, horn, bone, teeth, and wood; also earthenware vessels and spoons quite perfect."

In June, 1879, Mr. Frank was fortunate in finding the actual foundation of a hut, showing the flooring and portions of the side walls, the dimensions and other particulars of which I will afterwards discuss.*

There was no evidence that this settlement, like so many in Switzerland, came to an end by means of a conflagration; and, indeed, the freshness of the upper woodwork and the absence of burnt faggots, etc., negatived the idea of such a catastrophe.

The antiquities found on these remarkable peat dwellings are supposed to belong exclusively to the Stone Age, as hitherto no objects of metal have been found among them (**Figs. 34** and **35**).

Pottery.—A large quantity of whole and broken dishes are in Mr. Frank's collection. They are sometimes of a greyish colour, and at other times black, as if polished with soot or graphite. The paste is either fine and smooth or mixed with coarse sand, and it is of this latter quality that the larger vessels are made. Of some 140 specimens in Mr. Frank's collection the largest is 12 inches high. Both handles and perforated knobs have been in use. A few fragments of a fine yellowish paste are highly ornamented (**Fig. 34,** Nos. 17, 24, and 25). The fine black pottery consists of pretty jars, bowls, spoons, etc., which are often ornamented with a combination of lines, points, checks, knobs, etc. It is curious that there are no spindle-whorls, and only one object that can be considered to be a loom-weight.

Stone.—Flint implements to the number of 40, such as saws, arrow-points, and scrapers, are well made (Nos. 1 to 8). One semicircular saw is interesting as being a northern type, which, however, is not in Mr. Frank's collection, but in the Museum of Natural History at Stuttgart (No. 20). Of several stone hatchets some are plain and others perforated and beautifully polished,

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* *Matériaux*, vol. xvii. p. 321.

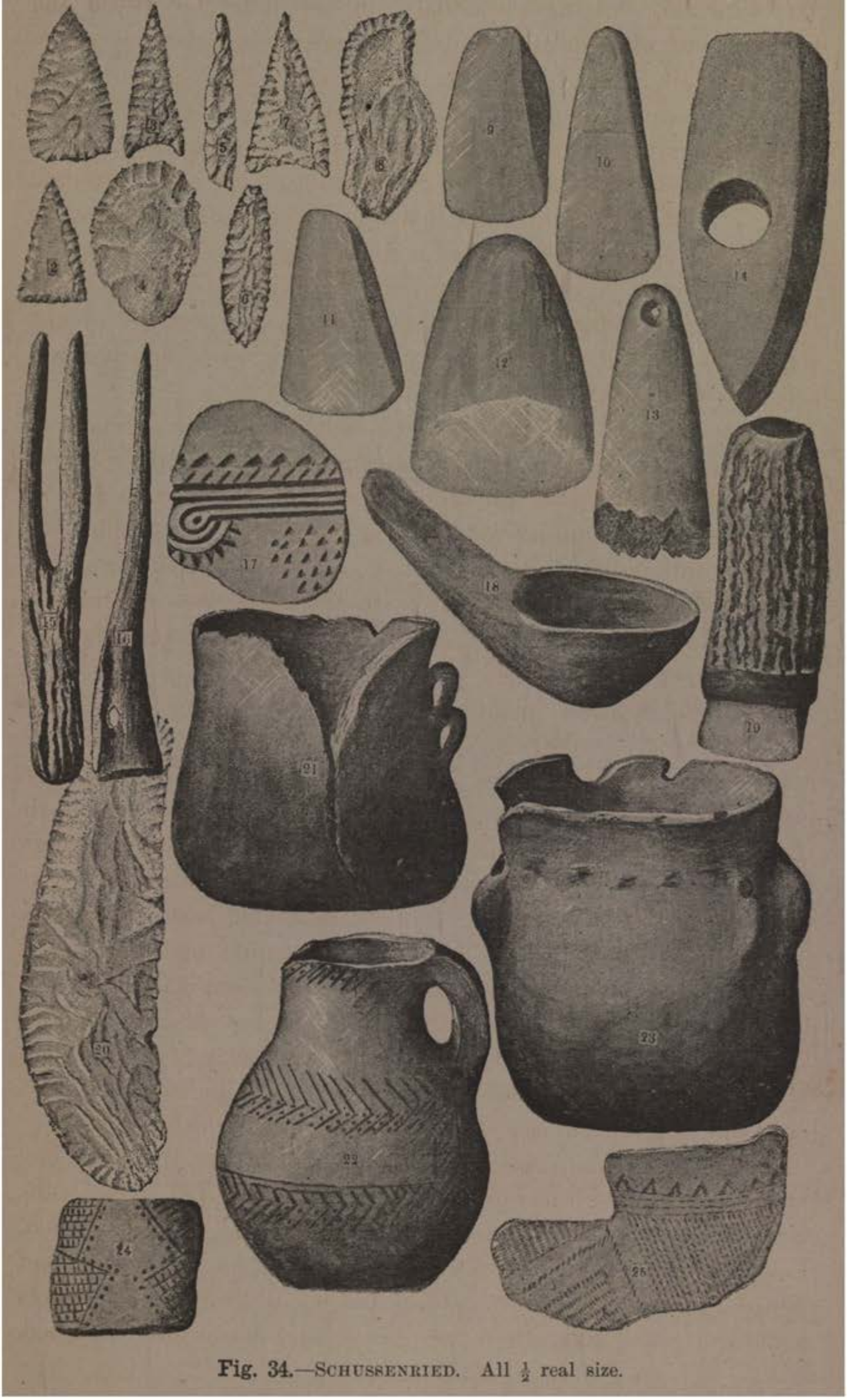
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Fig. 34.—SCHUSSENRIED. All ½ real size.

a few of which are still in their horn or wooden handles (Nos. 9 to 14 and 19). (No horn holders with square tops for insertion into wooden handles are in the collection.) The stone implements are generally made of granite or serpentine, one only being of

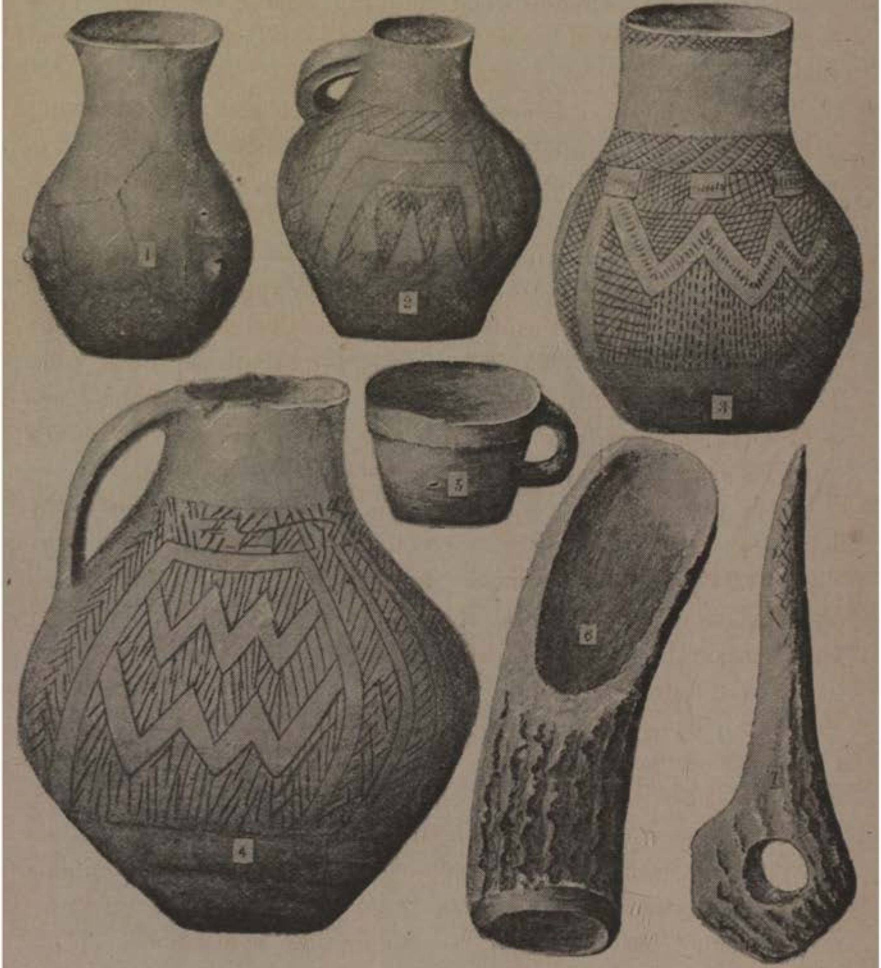

Fig. 35.—Schussenried. All ⅓ real size.

jadeite (sp. gr. 3·360). A small bit of red stone is perforated with three holes, precisely like similar objects from Robenhausen (**Fig. 24,** Nos. 5 and 6).

Horn and Bone, etc.—Of horn there are two scoops (**Fig. 35,** No. 6), and some perforated hammers (No. 7), one of which has portion of the wooden handle in it. There are also spoons of horn, as well as small bone chisels, daggers, pins, knives, haftings, etc. (**Fig. 34,** Nos. 15 and 16), perforated teeth, and some cutting implements of boars' teeth. Portion of the handle of a stone celt, still in its socket, is interesting, as showing a wedge which had been inserted so as to fix it more thoroughly, just as is done at the present day. A piece of wood, showing clearly the marks of a stone axe, is preserved by Mr. Frank in a liquid, as well as various wooden dishes.

Organic and other Remains.—Bits of rope and coarse matting made of bast, but no cloth, were found. As regards the latter, it was with special interest that I was shown a large consolidated mass of a black material, made of grains of wheat, which most distinctly retained the impression of a finely woven tissue, evidently that of the sack in which the grain had been kept. Other curious objects are two lumps of asphalt, one of which weighs three-quarters of a pound, and a dish filled with birch-bark in little rolls. Dr. Dom, of Tübingen,* believes that this so-called asphalt was a product of birch-bark, used by the lake-dwellers when mixed with a black powder for smearing over their dishes.

The eminent Professor Fraas, of Stuttgart, identified the following animals among the osseous remains submitted to him, viz. stag, roe, pig, bear, wolf, fox, lynx, hare, and bison (wild); and the dog, ox, marsh-pig, and sheep (domestic). It is noteworthy that neither the horse nor goat is here represented. (B. 303.)

Wheat, found plentifully, was determined by Professor Hegelmaier to be a large-grained variety of the common species (*Triticum vulgare*). Among other fruits and seeds were linseed, acorns, beech-nuts, hazel-nuts, etc. Pine was not among the wood.

In a jar was found a greyish-black powder, which on analysis proved to be carbonate of lime in combination with a bituminous substance. Another powder was found to be red oxide of iron.

One small bead, of bright red colour, like coral, finds a place in the Schussenried Collection; but the following objects are wanting, viz. clay ring supports, leather, cloth, bread, apples and pears, usually found in lake-dwellings.

From the facts recorded in Mr. Frank's long article, it would appear that the settlers at Schussenried commenced their residence before the girdle of peat, which now covers so largely the ancient bed of the Federsee, extended very far from the shore assigned to it by the retiring glaciers; and that since they abandoned their dwellings not less than 6 or 7 feet of peat have grown over them.

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* *Vereins für Vater. Naturkunde*, Stuttgart, 1878, p. 95.

OLZREUTHERSEE.

About two kilomètres north-east of Schussenried lies a small lake—Olzreuthersee—in which Mr. Frank has discovered the remains of a Pfahlbau of similar character to that just described. Being informed that flint and staghorn implements were turned up in a field close to this lake, he at once visited the spot, and recognised the site of a lake-dwelling, situated in a small peninsula some 800 square yards in extent, and rising 1½ foot above the water, which enclosed it on three sides. Here woodwork, pottery, and other *débris* of human occupancy were found embedded in a relic-bed rather less than a foot in thickness. The pottery was much broken, but it resembled that from Schussenried, both in quality and style of ornamentation. As at Schussenried also, neither spindle-whorls nor net-weights were found. Of 784 bits of flint collected, 178 were worked. They are thus classified:—47 arrow-points, 57 scrapers, 38 knives, 16 saws, and 20 of an undetermined character. Some of the arrow-points and saws are particularly well made. Of stone implements there were 11 axes of local materials (a few of which were perforated), and 3 hatchets and 4 chisels of nephrite. The nephrite hatchets were small, the largest measuring only 1½ inch by 1¼ inch, and the chisels were 2 inches to 3 inches in length by ¼ inch to 1 inch in breadth. There were besides several corn-crushers, 28 staghorn implements, some perforated, and rolls of birch-bark, etc., but no trace of any metal. Also a few needles, awls, and small chisels.

Mr. Frank draws attention to the remarkable fact, that while here there were nephrite objects, and no jadeite, the very opposite was the case at Schussenried. (B. 395.)

DANUBIAN BASIN.

Crossing over to the great Bavarian plateau which commands the sources of the Danube, there are on the northern flanks of the Alpine chain of mountains a series of lakes, many of which have been shown to contain remains of lake-dwellings. Those which have been sufficiently investigated to claim a notice here are the following:—Würmsee, Mondsee, Fuschlsee, Attersee, and Neusiedlersee.

LAKE OF STARNBERG (WÜRMSEE).

The Lake of Starnberg lies about 18 miles to the south of Munich, close to the spurs of the great Alpine chain of mountains. The coast is an undulating upland, interspersed with woods, villas, pleasure-grounds, and pretty villages—a passing glimpse of which, together with a constant view of the snow-clad mountains in the distance, renders a trip on this lake one of the most enjoyable attractions to Munich. At its northern end, where its surplus water is carried off by the Würm, it is only about a mile in breadth, but as we sail southwards it expands considerably, and ultimately attains a breadth of three or four miles, with a total length of 12 miles. About four miles up on its western side there is a low but prettily wooded island, called Rosen Insel since 1850, because it was then purchased by the King of Bavaria. Here a royal residence was built on the ruins of an old ecclesiastical establishment, and when its foundations were being dug various sepulchral remains of a mixed character were met with—prehistoric, Roman, and mediæval. Tradition says that the island was originally the site of a heathen temple and a sacred burying-place, which was subsequently appropriated by the Christians and used for similar purposes.

When Professor Desor visited the locality in 1864 in search of lake-dwelling remains, he found on the western margin of this island numerous piles, associated with some antiquities of the lacustrine kind so largely found in the Swiss lakes, from which he concluded that this was the site of a pile-village, and suggested that the whole island might be of an artificial nature During the following year some further excavations were made, but no important results ensued beyond corroborating the opinion of Desor.

In 1874, however, advantage was taken of the low state of the water, and extensive excavations were made under the superintendence of Mr. v. Schab, the Government law-officer at Starnberg. Numerous shafts were dug on the margin of the island, and in all cases a relic-bed was encountered containing antiquities, apparently of very different ages. Not only was

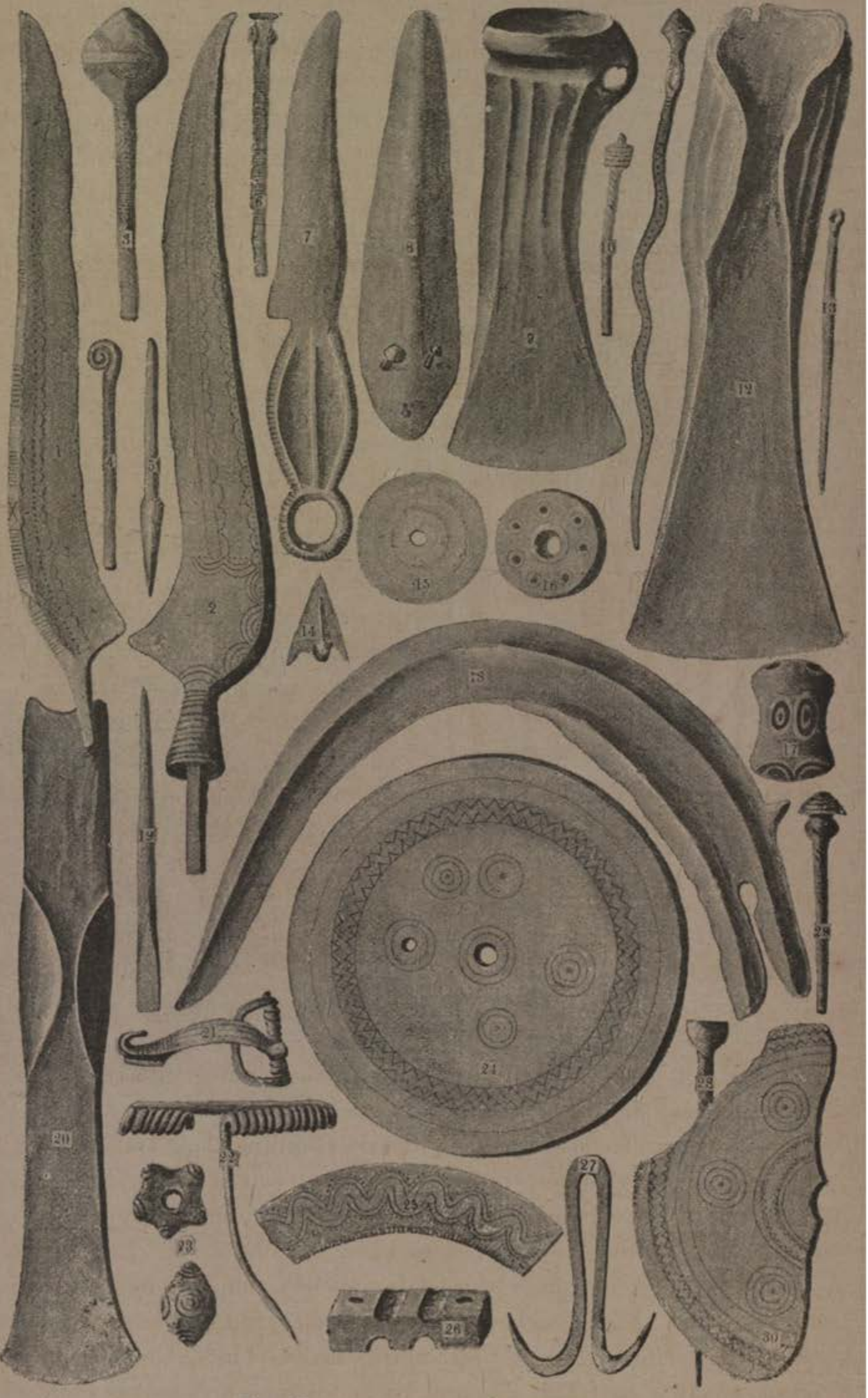
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Fig. 36.—STARNBERG. All ½ real size.

there abundance of the usual relics of the Stone Age, but also some of bronze, iron, glass, amber, etc. The collection of objects then made is thus summarised in Mr. v. Schab's report (B. 291):—Of staghorn 187, bronze 158, stone 69, bone 48, wood 7, iron 6, glass 3, and amber 1. The collection is deposited in the Ethnological Museum of Munich, from which I have had the privilege of taking most of the accompanying illustrations (**Figs. 36** and **37**). There appear to be more objects in the case in the Museum from the Starnberg lake-dwelling than Von Schab describes, as, for example, the bronze socketed celt (**Fig. 36,** No. 9), but on the other hand it is well known that some have fallen into private hands.

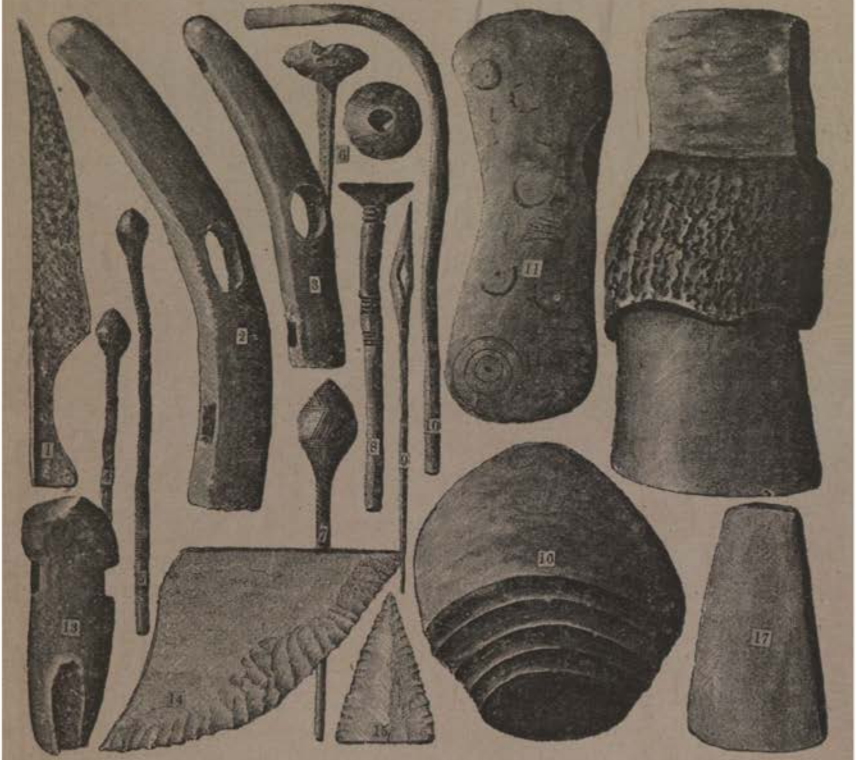

Fig. 37.—STARNBERG. Nos. 1 = $\frac{1}{6}$, 13 = $\frac{1}{4}$, and the rest = $\frac{1}{2}$ real size.

Stone.—The flint from this station is of a bluish-grey colour, and does not correspond with the French kind. The articles made from this substance are chips, arrow-points, lance-heads, scrapers, saws, etc. (**Fig. 37,** Nos. 14 and 15). Of nephrite there are one or two specimens in the form of small cutting implements; of ordinary stone celts there are a few more or less perfect (No. 17), and one is in a horn casing (No. 12); also some polishers, and grindstones.

Horn, etc.—Various kinds of hafting; about 12 bridle-guiders, a few of which are whole (Nos. 2 and 3); several perforated hammer-axes (Nos. 11 and 13); bone daggers, perforated boars' tusks, awls, etc. The most remarkable objects are two or three large bone discs ornamented (**Fig. 36,** Nos. 24 and 30).

Bronze.—Portion of a solid bracelet ornamented with lines and concentric circles, awls and chisels (Nos. 5 and 19), knives (Nos. 1, 2, and 7), daggers (No. 8), hatchets (Nos. 9, 12, and 20), ornamented pins (Nos. 3, 4, 6, etc.), fibulæ (Nos. 21 and 22), needles (No. 13), arrow-points (No. 14), fish-hooks (No. 27), one sickle (No. 18), portion of an ornamented plate (No. 25).

Iron.—A large knife (**Fig. 37,** No. 1), a horseshoe, two spear-heads.

Pottery.—Fragments of pottery were very numerous, probably indicating 100 vessels; but no entire dish is among them. The ornamentation is varied, and consists sometimes of parallel grooves, like that of the terramara pottery in North Italy (**Fig. 37,** No. 16). The paste used was also of a varied quality. Spindle-whorls of various sizes and forms, clay support-rings, and conical and quadrilateral clay weights; also large beads of burnt clay of an orange colour, ornamented with concentric circles of blue and white (**Fig. 36,** No. 17).

Glass, etc.—A few glass beads of variegated colours (No. 23), and one of amber.

Wood.—Wooden wedges, spoons, a fragment of basket-work, etc.

Organic Remains.—Hazel-nuts, burnt corn, and various other seeds. As to osseous remains, those of the domestic animals were twice as numerous as those of the wild species. It may be interesting to note that amongst the latter are included the reindeer (one portion of a horn), cat (one lower jaw of large size), beaver (four individuals), and two kinds of dog (*Canis familiaris* and *matris opt.*).

MONDSEE.

A couple of miles to the west of the southern end of the Attersee lies the Mondsee, followed farther up in the same valley by the small lake of Fuschl, both of which send their united surplus water into the former. Just opposite the outlet of the Mondsee, at a place called See, the site of a very interesting lake-dwelling was discovered, which since 1872 has been very carefully investigated by Dr. Much, of Vienna, with the result that this indefatigable explorer is now in possession of one of the most instructive collections of lake-dwelling remains in Europe. The SEE station covered an area of some 3,500 square yards. The piles were round, 3½ inches to 8 inches in diameter, and irregularly placed, and the relic-bed was deeply covered with mud. The antiquities, many of which are here illustrated (**Figs. 38, 39,** and **40**), may be thus classified.

Stone.—Flint arrow-points, in great numbers, are of a triangular shape and very neatly made. One or two have still traces of asphalt, by means of which they were attached to the stem (**Fig. 38,** Nos. 10 to 12). Some of them are in an unfinished state, and one is of transparent rock-crystal. Among the flint saws are several half-moon-shaped implements similar to those so frequently met with in the Scandinavian archæological area (Nos. 2 to 4). Some of this type were made with a projection for a handle like the knives used by modern leather-cutters. Lance-heads and scrapers are also numerous and well made. From the presence of a quantity of chips and flint refuse there can be no doubt that all these implements were manufactured *in situ,* a remark which equally applies to the knives (Krummesser) of Danish type, which were made of the same kind of flint, the raw material for which could be readily found in the gravel of the neighbouring streams. Among the ordinary stone implements are about two dozen perforated and highly finished axe-hammer heads (Nos. 13 to 15). The material is often a variegated serpentine. The polished celts amount to nearly 100 specimens, of which the largest is 6¾ inches long and the smallest 1¼ inch. One highly polished circular stone with central perforation might have formed the head of a club (**Fig. 40,** No. 9).

Horn and Bone.—Of this class of remains, there is a remarkable assortment of chisels (**Fig. 38,** Nos. 16, 27, and 28), pointers, etc., and particularly noteworthy are the double-pronged daggers (**Fig. 39,** Nos. 9 and 12). These are invariably well made and beautifully polished, and some have a groove as if for attaching a string. There is only one staghorn hafting for a celt, and it is bored in the

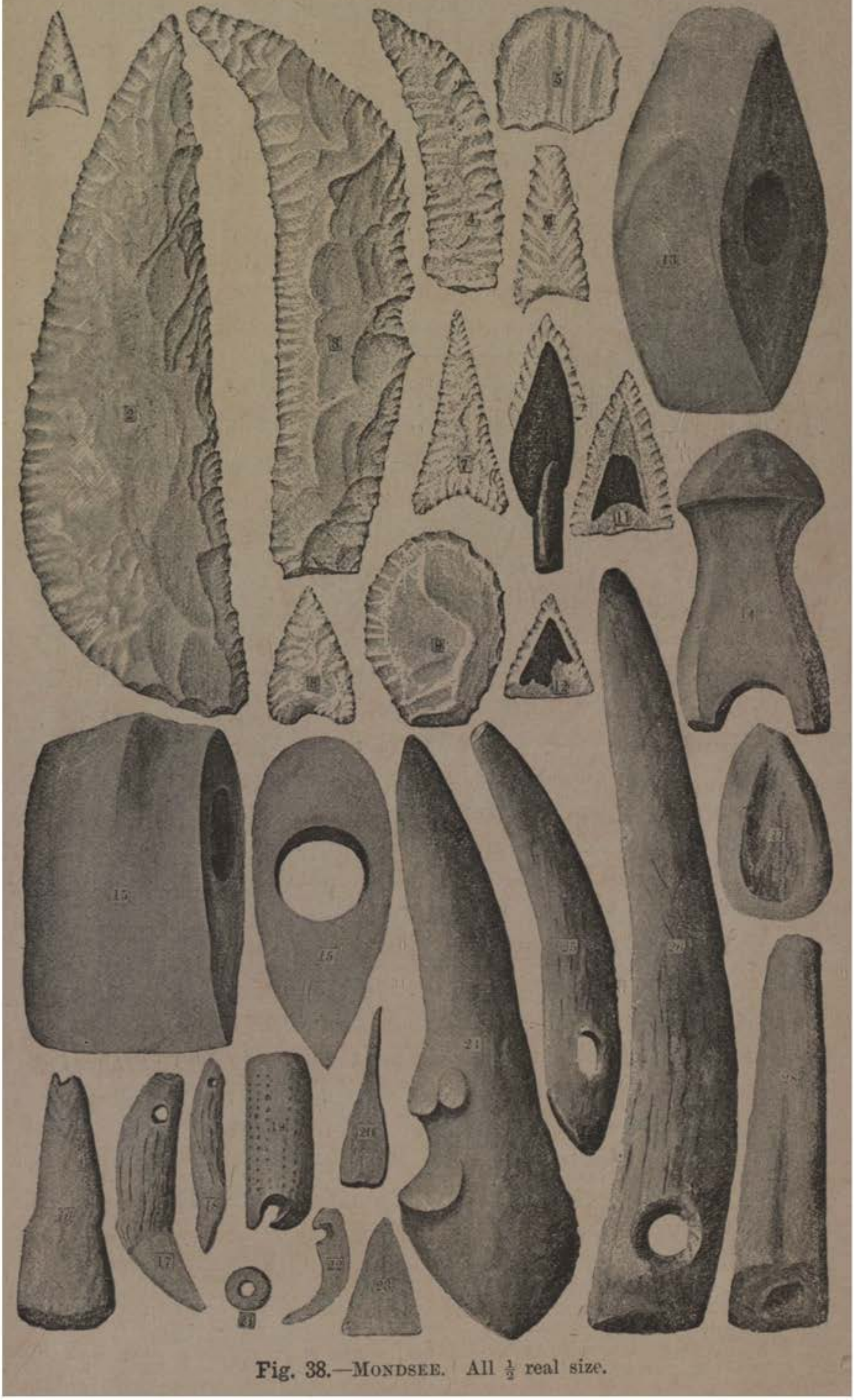
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Fig. 38.—Mondsee. All ½ real size.

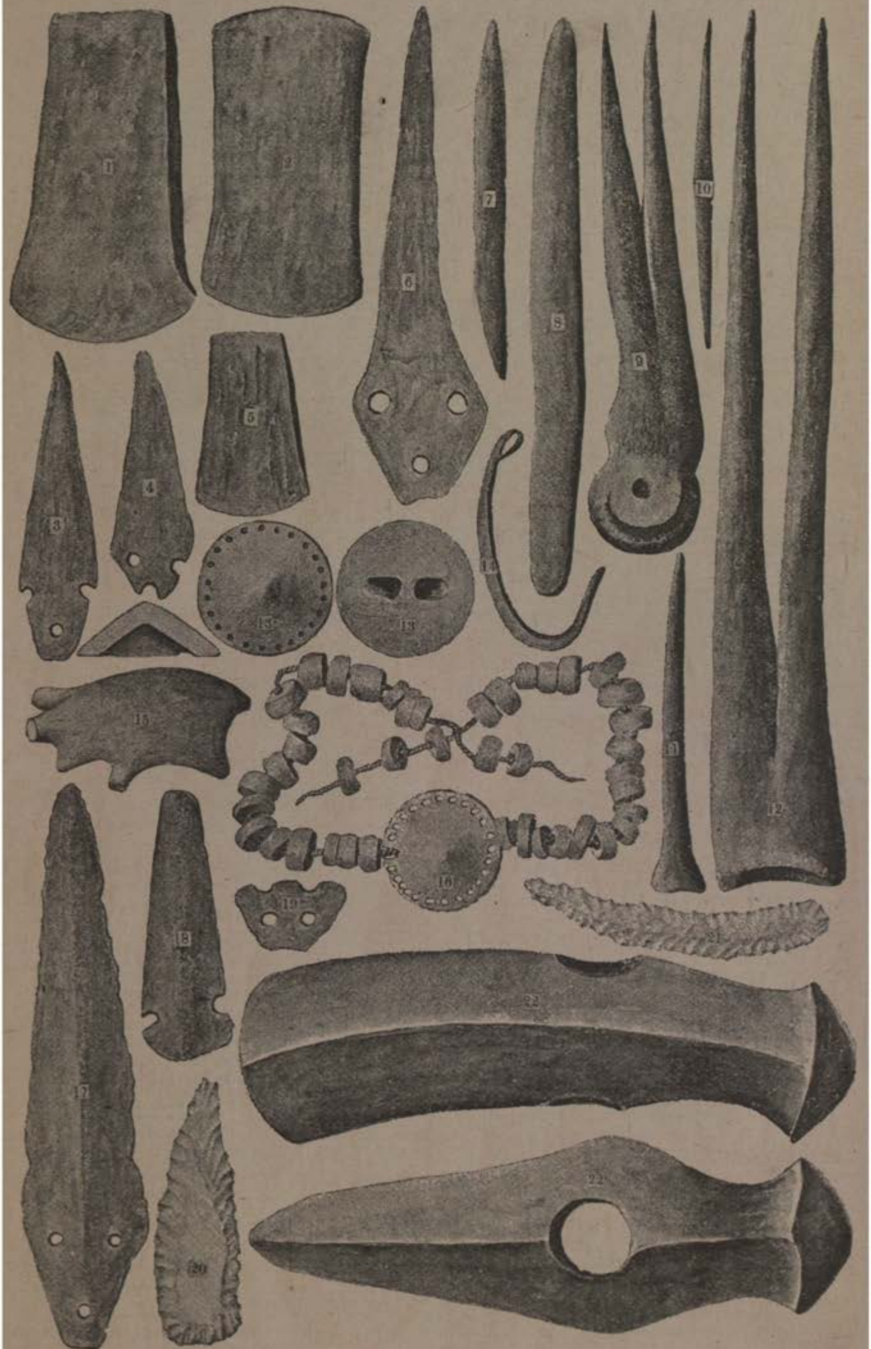
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Fig. 39.—Mondsee and Attersee (17, 18, and 20 to 22). All ½ real size.

middle for a handle, but the number of perforated hammers of this material is considerable. One triangular arrow-point is of bone (**Fig. 38,** No. 23).

Metal.—From the commencement of the investigation of this settlement it was inferred, from the finding of a number of coarse crucibles with projecting handles, that its inhabitants were acquainted with the art of smelting. Not only was there a little copper found in the pores of these utensils, but there were, among the wooden objects, some crooked clubs with a slit at the end (**Fig. 185,** No. 14), which could only be used as handles for flat celts such as those generally made of copper. Within the last few years these surmises have been confirmed by the discovery of several metal objects, chiefly of copper, among which are:—14 flat celts (some are in a fragmentary condition) (**Fig. 39,** Nos. 1, 2, and 5), six daggers (Nos. 3, 4, and 6), three spirals, three awls, one fish-hook (No. 14), and two small indefinite objects. Of bronze there are only two articles, viz. a portion of a dagger showing rivet-holes, and a portion of the stalk of a pin.*

Pottery.—The larger vessels are made of coarse clay mixed with sand, and are both clumsy and unornamented, with the exception sometimes of nail marks round the rim. Instead of handles they have perforated knobs below the rim or on the bulge of the vessel. In striking contrast to these coarse dishes are richly ornamented jugs made of a fine paste, and other small dishes with or without handles. The ornamentation is peculiar, consisting of deep broad lines, arranged in a variety of patterns, in which a white chalky substance was inserted, and to retain it better the bottom of the incised lines was sometimes corrugated (**Fig. 40,** No 6). The colour of this pottery is now greyish, but originally it is supposed to have been black, so that the white ornamentation on a black ground must have had a striking effect. A few objects of clay, in the form of rude figurines, which might be conceived to represent some common quadruped, as a dog, or a pig, or a cow, may also be noted (**Fig. 39,** No. 15).

Other Objects.—It is somewhat remarkable that in the whole of this large collection there are only three small perforated objects of stone which could be taken for spindle-whorls, and only one clay weight; nor is there anything else that would

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* "Kupferzeit in Europa," p. 9.

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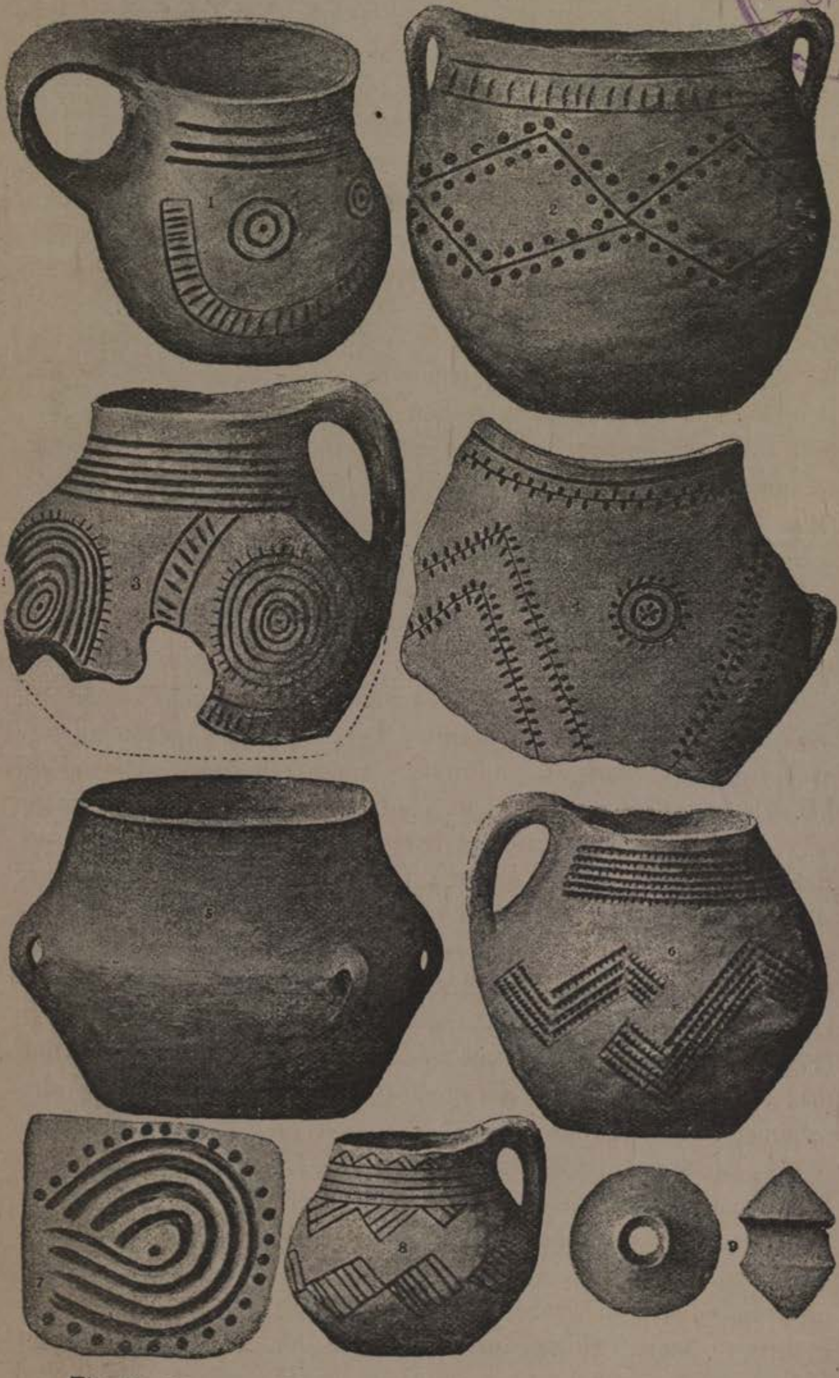

Fig. 40.—MONDSEE. Nos. 6, 8, and 9 = ¼, and the rest = ½ real size.

indicate the art of weaving, with the exception of a few knotted strings and a closely plaited mat made of bast.

The personal ornaments are very various. Perforated teeth, imitations of the claws of birds in white marble (**Fig. 38,** No. 22), and circular plates of marble in the form of buttons, beads, etc. (**Fig. 39,** Nos. 13 and 16). In one place not less than 48 of the latter were brought up at one haul of the dredger, which, when restored in order, reproduce a bracelet (No. 16).

In 1874 Dr Much discovered a second station at SCHARFLING on the south shore of the Mondsee, but being in deep water, and subject to the deposition of much *débris* brought down by the Kienbach, the difficulties of a thorough investigation have not yet been overcome.

Of the investigations conducted from time to time in the Mondsee, and the antiquities collected, Dr. Much has given several accurate reports. (B. 223, 257, and 287.)

ATTERSEE (UPPER AUSTRIA).

The first notices of investigations of the lake-dwellings in the Attersee were published in 1871 by Count Wurmbrand and Mr. Simony, and these were continued by the former during the following five years, according as fresh discoveries were made. (B. 200, 201a, 202, 229, and 276.) There were five settlements in the lake—one, SEEWALCHEN, near the outlet; two, ATTERSEE and AUFHAM, on the west shore; and two, WEYEREGG and PUSCHACHER, on the east shore.

SEEWALCHEN.—This settlement formed an irregular quadrangle, some 500 by 180 feet, and distant from the nearest shore between 200 and 300 feet. The water here is about 5 feet deep, and though clear, no relics or piles are visible, as the *débris* are covered over with a bed of gravel, which had to be removed by dredging. The piles were round timbers 6 to 8 inches in diameter, and 3 to 4 feet apart, which penetrated so deeply into the shell-marl that it was with difficulty any of them could be pulled up. The relic-bed was a blackish conglomerate of organic *débris*, about a foot thick, and greatly compressed by the superincumbent gravel. Count Wurmbrand does not think this settlement had been destroyed by fire, as the usual symptoms of such a catastrophe are entirely wanting. The antiquities, though numbering among them a few metal objects, are essentially of the Stone Age, among which the following are the most typical.

Stone.—The arrow-points of flint are all triangularly shaped, no example with a central stem having been discovered. One remarkable object is a small knife-flake of obsidian. Stone celts (a few perforated and mostly broken) were made of diorite, greenstone, granite, hornblende, etc., but none of nephrite. Grinding and polishing stones were abundant.

Horn and Bone.—Of these materials there were pointers (some with double prongs), chisels, scrapers, but none of the haftings for celts, such as those so frequently met with on the sites of the Swiss lake-dwellings; some bone rings, probably intended for beads, and others of cannel-coal.

Pottery.—Pottery was not abundant, but judging from its character, Count Wurmbrand thought that it was smeared over with graphite or some colouring matter, and burnt in an open fire. The ornamentation was made with the finger-nail, or with small pointed implements, in the soft clay. Some fragments showed handles and others perforated knobs.

Metal.—Two small bronze pins, one with conical head, and perforated in the stem a little below the head. It is quadrilateral in its lower two-thirds, and ornamented with dots. The other objects are an awl, sharpened at both ends, a lump of bronze, and two small fragments of iron.

The animal remains belonged to the pig, bear, beaver, ox, and stag.

Among the woods used were fir, lime, beech, oak, hazel, birch, and cornel-cherry.

WEYEREGG.—The station next in importance is Weyeregg, about a third of the way up the lake. It has yielded well-made bone implements, worked tines of horns, perforated boars' teeth, and some finely polished stone hatchets. One is of a sea-green colour like jade, and another has an elegant form (**Fig. 39,** No. 22). Latterly a few metal objects have been found on this station, among which are the two daggers here represented (Nos. 17 and 18). On the remaining stations only a few objects of stone and pottery have been collected, sufficient, however, to show that they were similar to those already described. On PUSCHACHER there were found two half-moon-shaped flint knives (Krummesser) (Nos. 20 and 21), and a round stone ball of polished serpentine neatly perforated, supposed to have been a mace.

FUSCHLSEE.

On the south shore of Lake Fuschl there is a small island of circular form, and about 50 paces in diameter, which, it seems, is of artificial construction, and strikingly analogous to our Scottish and Irish crannogs. The island, which is a little raised above the level of the water, lies close to the shore, being only separated from it by a narrow ditch or canal, which in the course of time has got filled up with moss and the *debris* of marsh plants. On digging a hole in its interior there was encountered first a thick layer of moss and heather, and then a mass of decayed wood, chiefly branches of pine and dwarf birch. This mass was kept together by small piles, but around the margin there were stronger piles and a quantity of other beams to be seen. Few antiquities were, however, found on it, and its investigation from this point of view did not seem very encouraging. (B. 257.)

NEUSIEDLERSEE.

Over the vast territory drained by the Danube there are some further lacustrine remains indicative of lake or pile dwellings, but which are probably only a small fraction of what could be revealed with careful and systematic research. In 1872 Jeitteles published a notice of pile structures discovered in the town of Olmütz (B. 221); and more recently at Nimlau, in the same neighbourhood, similar wooden structures were detected in a pond. In this case there were five rows of oak piles associated with cross-beams; each row was five feet apart, and the whole was covered with mud to the extent of nearly two feet.[*]

In 1874 Count Béla Széchenyi (B. 283) made some important discoveries at the south end of the bed of the Neusiedlersee, which can hardly be explained on any other hypothesis than that they were the industrial *débris* of a lake-dwelling. This is a large lake of brackish water measuring about 72 miles in circumference, but so shallow that in its deepest part it attains only a depth of 10 or 12 feet. It terminates at its south-east side in a swamp called Hanság, ("floating turf"), of greater extent than the lake itself. It appears to be subject to great fluctuations in its extent, so much so that in 1854 its area commenced to decrease till in a few years later its bed became completely dried up. Cultivation of the land occupied by it was then begun, but the water has since returned. It was in 1874, on land reclaimed from this lake in these circumstances, that Count Széchenyi found, scattered over the surface, bits of pottery, stone celts, flint implements, etc. On making systematic investigations of these finds, along with some of his scientific friends, he found that in two spots these relics were met with in greater profusion, and that, corresponding with these productive areas, there was a substratum of blackish mould which became more clearly defined by the rankness of its vegetation. These were supposed to have been the sites of habitation, and accordingly excavations were undertaken to clear up the matter, but they revealed nothing new. Only the same classes of relics were found as on the surface, with the exception of a few bones very much decayed. No piles were observed, and after digging to the depth of about three feet water came into the trenches and so stopped further progress in this direction. About 100 square yards were explored, during which the following relics were collected:—31 perforated stone axes or hammers, of which only two were whole;

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[*] *Mitt. Anth. Ges. Wien.* vol. xv. p. 120.

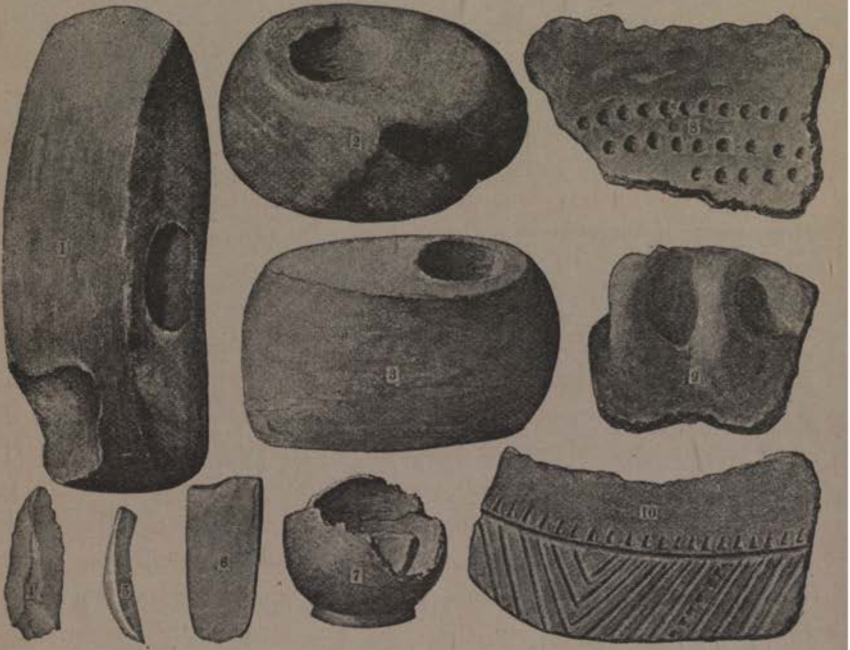

Fig. 41.—NEUSIEDLERSEE AND KEUTSCHACHERSEE (10). All ½ real size.

96 plain stone axes, of which about two-thirds were well formed, the rest being more or less fragmentary; six stone chisels, and 14 worked stones or polishers, corn-grinders, etc.; a net-sinker and two small beads, together with a few scrapers and flint-flakes; and pottery to the amount of 200 to 300 fragments, among which only three vases were still entire. Illustrations of some of these relics are given on **Fig. 41,** Nos. 1 to 9.

The osseous remains were much decayed, but among them the following animals were identified, viz. stag, urus, ox, pig, and horse (represented only by two teeth).

Flints were comparatively rare, but the stone implements were varied both in form and material, being made of such materials as serpentine, diorite, basalt and schist.

The pottery, though rude, appeared to have been partly made on the wheel, but yet had finger-nail marks and other curved impressions as ornamentation. All sorts of handles were used, from mere perforations for strings to the most perfectly made handle. The paste was mixed with coarse materials.

The non-appearance of piles and organic matter may probably be accounted for by their rapid decomposition from alternate exposure to air and water.

Further notices of these finds were given by Count Wurmbrand (B. 259), Dr. Much (B. 318), and Von Luschan (B. 365).

PILE STRUCTURES IN HUNGARY.

On the right bank of the Theiss, a few miles from the railway-station of Szolnok, and near the village of Tószeg, there is an artificial mound called "Kuczorgó or Lapos-halom," to which, since the meeting of the International Congress, at Buda-Pesth, in 1876, much importance is attached on account of the opinion expressed by Pigorini that it is identical in structure with the terramara mounds of Northern Italy. The mound, though now considerably undermined by the river Theiss during the great floods of 1876, is still of considerable extent, measuring some 360 mètres in length, and 100 in breadth, and rising to a maximum height of 8 mètres over the surrounding plain. It is only in times of flood that the waters reach the mound, its usual bed being about 1½ mile distant. When the artificial nature of this mound became known by the section exposed by the floods, some extensive investigations were made to determine its archæological character. The objects collected in these researches were exhibited at the Congress as a special find, and among them were the following (Catalogue, pp. 85–87):—

1. Perforated hammers of staghorn, various pointed implements of horn and bone, perforated teeth of pigs, and a leg-bone perforated in two places, probably a skate.

2. Polished stone celts and perforated hammers, four flint flakes, and one of obsidian, corn-crushers, and various other worked stones.

3. Fragment of a bronze pin, a bronze knife, and a small ingot of bronze.

4. Pottery, showing a variety of dishes, some with handles, etc.; various objects of burnt clay, as a whistle, buttons, a spoon, 18 pyramidal clay weights (perforated), etc.

5. A considerable amount of food refuse, as bones, scales of fish, shells, charred wheat, etc.

When the International Congress was held at Buda-Pesth, Pigorini, Virchow, and Miss Mestorf visited this mound, and made some further researches, which not only confirmed Pigorini in his suspicions about the structure of the mound, but also led his distinguished fellow-investigators to accept the main portion of his theory. Upon their return home they * published separate accounts of this excursion to Tószeg and the results obtained, from which I must here be content to notice that the following propositions are admitted facts:—

1. The existence of piles and wooden beams was satisfactorily proved, and Pigorini asserts that these corresponded with three different levels, precisely as they occur in the terramara mounds.

2. The materials containing the *débris* of occupancy were distinctly stratified, forming parallel or undulating layers, amounting to a total thickness of 4 mètres.

3. The antiquities collected represented all ages, including stone celts, bronze and iron implements, and a skate made of the leg-bone of a horse.

Subsequently Dr. Romer gave an account of the excavations conducted at Tószeg previous to the meeting of the International Congress, in an article entitled "Les Terramares en Hongrie," along with which he describes similar deposits at other places, as

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* Pigorini, B. 298*e*; Virchow, B. 293; Mestorf, "Der Intern. Anthrop. und Arch. Cong. in Buda-Pesth."

Nagy-Rév, Szelevény, Keménytetö, and Ásott-halom. In regard to the latter station he remarks that rotten piles were observed in its lowest stratum before Pigorini called attention to their importance. Some of the objects from Asott-halom were exhibited at the Congress (see Cat., p. 44), and included polished stone axes and hammers, flakes of obsidian, perforated hammers of staghorn, etc. The author concludes his article by stating that the terramara deposits are by no means confined to the valley of the Tisza, as they have already been observed in various other low-lying districts along the Danube, Garam, etc. (B. 316.)

RESEARCHES IN THE LAKES OF CARINTHIA AND CARNIOLA.

In 1864 Professor Ferdinand v. Hochstetter gave a report of researches conducted by him, at the request of the Royal Academy of Sciences of Vienna, in the lakes of Carinthia and Carniola in search of remains of lake-dwellings. (B. 98.) But the results were, in the main, of a negative character, as no traces whatever were found in the lakes of Millstätter, Afritzer, Brenn, and Weissen, in Carinthia; nor in those of Weldeser, Wocheiner, and Zirknitzer, in Carniola. In the latter lake it was confidently expected that lake-dwelling remains would be discovered, as the chronicler Valvasor (1689) relates that in this lake there was an old bridge, whose piles he himself had seen; but upon Von Hochstetter and Deschmann visiting the locality nothing whatever could be seen of this character.*

On the other hand, Von Hochstetter believed that he had succeeded in finding traces of these settlements in no less than five lakes in Carinthia, viz. *Wörther*, *Keutschacher*, *Rauschelen*, *Ossiacher*, and *Längsee*. The *Keutschachersee* is, however, the only one which has yielded positive remains of a sufficiently varied character to render the evidence of Pfahlbauten more than problematical. This small lake, known also as the *Pluschischersee*, which lies to the south of the Wörthersee, contains near its middle a shallow portion which can be readily distinguished from the shore by the rushes which grow over it. The area of the space thus marked out is not great, measuring only 20 fathoms long (Klafter) by 10 fathoms broad, and it is covered by water never less than 4 to 6 feet in depth. Here piles and large beams were seen embedded among stones and mud, but so firmly that they could not be drawn up. Notwithstanding the difficulty of examination, some relics of human occupancy were collected. These, which were subsequently augmented by a further investigation by Mr. Ullepitsch, of Klagenfurt, are deposited in the museum of that town; they consist of portions of half-burnt clay with the impression of wattling, and are supposed to be part of the walls of a cottage. There are also one or two fragments of black and grey pottery, one of which is ornamented (**Fig. 41,** No. 10); a sharpening or grinding stone; a bit of staghorn, together with charcoal; heaps of shells (*Adonta*); hazel-nuts, and portion of a wooden pile.

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* *Mitt. des Hist. Vereins für Krain*, October and November, 1864.

Dr. v. Hochstetter draws attention to the extraordinary number of submerged cairns which he discovered along the shores of the Wörthersee and Ossiachersee. On the eastern shore of the latter he counted no less than 29. These cairns are about 6 feet high, with a diameter of 15 to 20 feet, and their tops are generally covered with 4 to 6 feet of water. It will be remembered that similar cairns were observed in Lake Morat.

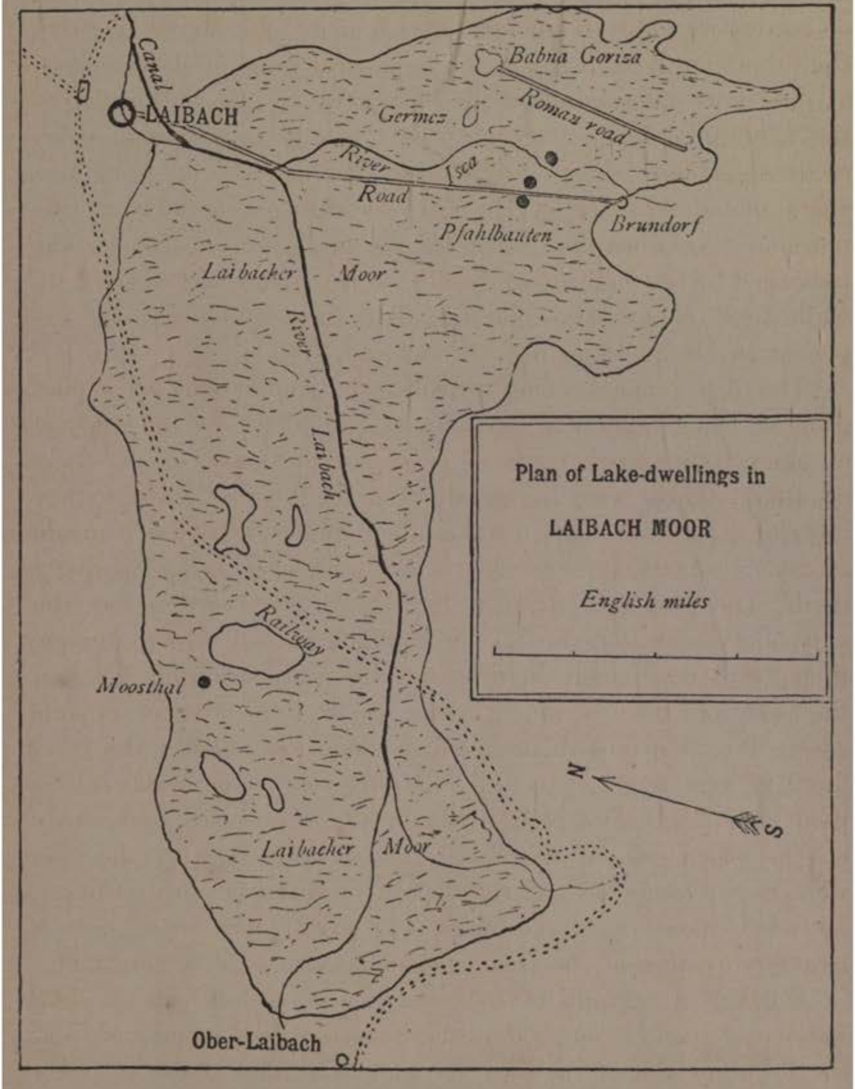
The only other place which suggested the existence of lake-dwellings was the "Laibacher Morast," in which, a few years previously, a couple of canoes, and some other industrial relics, were dug out of the peat, the full significance of which only now became apparent. Since then the vast morass has yielded a large quantity of the *débris* of these settlements, which I shall now proceed to describe.

LAIBACH MOOR (CARNIOLA).

What is known as Laibach Moor is an extensive but irregularly shaped plain now nearly all well cultivated, which extends southwards from the town of Laibach to Ober-Laibach, some 12 miles distant. Previous to a series of drainage schemes, executed at various times during the last fifty years, the whole of this plain was a morass or peat bog, and there can be no doubt that in pre-historic times it was a navigable sheet of water. It covers an area of about 85 English square miles, and is interspersed here and there with six or seven rocky eminences, which, when the locality was under water, formed so many islands. It is also intersected by the rivers Laibach, Isca, and some smaller streams, which unite before reaching the town of Laibach, and about half way up it is crossed by the railway to Trieste. Some years ago a new road was constructed along the valley of the Isca, from Laibach to Brunndorf, and in 1875, in the course of excavating a ditch alongside of it, various bone implements and fragments of pottery were turned up by the workmen. Mr. Martin Peruzzi, the proprietor, recognising the archæological value of these objects, at once gave information of the discovery to the authorities of the Landesmuseum at Laibach. This led to an extensive series of investigations, which were continued during the following two years under the care of Dr. Karl Deschmann, curator of this museum. An illustrated report of the first year's operations was published by the eminent archæologist, Baron von Sacken (B. 290), while those of the two following years have found an able exponent in Dr. Deschmann. (B. 302 and 317.)

The first year's working revealed the foundations of a pile-dwelling close to the road on its west side, where, by the removal of some 3,000 square yards of peat, quite a forest of piles was disclosed. These were irregularly placed, but on an average they numbered three or four in a dozen square feet. They were made of aspen, poplar, elm, and fir, the last, however, being sparingly used. The peat was about 6 feet thick, and below it was the ancient sediment of the lake into which the piles were driven, their heads now merely entering into the peaty stratum. Between the peat and lake sediment there was a thin layer of organic *débris*, 4 or 5 inches thick, in which alone the relics of the lake-dwellers were found. In the following year some 2,000 square yards were cleared of peat, partly in the same place, and partly on the other side of the road. In this new locality the piles were more closely set and the deposit of peat was a little thicker, but the character of the relics was exactly the same, only a larger proportion of the fragments of pottery were ornamented.

During the autumn of 1877 the site of a third pile-dwelling was come upon, about 300 yards from the last mentioned, and on the other side of the Isca (see Sketch, p. 171), under precisely similar conditions as the two former, but owing to want of funds the excavations were discontinued before the entire area was searched. Dr. Deschmann is of opinion that these are by no means the only portions of the moor in which lake-dwellings existed, as indications of them were found in several other places along the bed of the Isca. In further support of this opinion I may mention that in 1857, before lake-dwellings had attracted attention in this quarter, some objects were found at Moosthal, in


Canal
LAIBACH
Babna Gorisa
Roman road
Germez
River Isca
Road
Pfahlbauten
Brundorf
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Railway
Moosthal
Laibacher Moor
Ober-Laibach
Plan of Lake-dwellings in
LAIBACH MOOR
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quite a different part of the moor, which point to its being the site of a lake-dwelling. Here the peat was 10 feet deep, and at this depth, and lying immediately over the lake-silt, were found three perforated staghorn hammers, two canoes, and some other objects of human industry, which, however, were dispersed before Dr. Deschmann became aware of the discovery.

The relics of human industry collected during these systematic explorations, with the exception of a few in the Museum of Vienna, are deposited in the handsome new Museum at Laibach, where they form a remarkably complete and interesting demonstration of the culture and civilisation of the lake-dwellers. Some of these are illustrated on **Figs. 42, 43,** and **44.**

Pottery.—Vessels for household use are extremely abundant, and varied in form and ornamentation. They are all hand-made, and the quality of the paste appears to have been good—that for the larger dishes was mixed with rough sand. All the pottery has a darkish appearance, but most of the smaller vessels had been smeared over with some black composition. Not a few of these dishes were quite whole, so that their varied forms and uses may be readily distinguished. They may be classified as jars, vases, cups, plates, jugs, bowls, flasks, spoons, etc.; and ordinary handles, perforated knobs, tubular borings *(ansa canalicularis)* appear to have been indiscriminately used.

Some of the smaller dishes have four or five stud-like processes or rudimentary feet, and others have a pedestal-like base, slightly expanding at the lowest point, on the underside of which there is often impressed the shape of a broad cross (**Fig. 42,** No. 20). The ornamentation, when reduced into its simple elements, may be thus stated:—

(1) Straight or wavy ridges, sometimes notched across, and running upwards or across the body of the vessel; (2) finger or nail marks; (3) checks made with groups of incised lines crossing each other; (4) lozenge-shaped spaces alternately plain and lined; (5) herring-bone pattern; (6) triangles, crosses, wheels, rhombs, and other simple geometrical figures, sometimes with inscribed figures or lines; (7) impressions of strings, points, etc. The style of the more highly ornamented vessels is, though complicated, artistic, and when the incised lines were filled with a white material, as is supposed to have been the case with some of them, these patterns on a dark or black ground must have been very effective. Ornamentation is not always confined to the outside of the vessel, as may be seen from **Fig. 43,** No. 8. Dr. Deschmann sees a striking resemblance between the Laibach

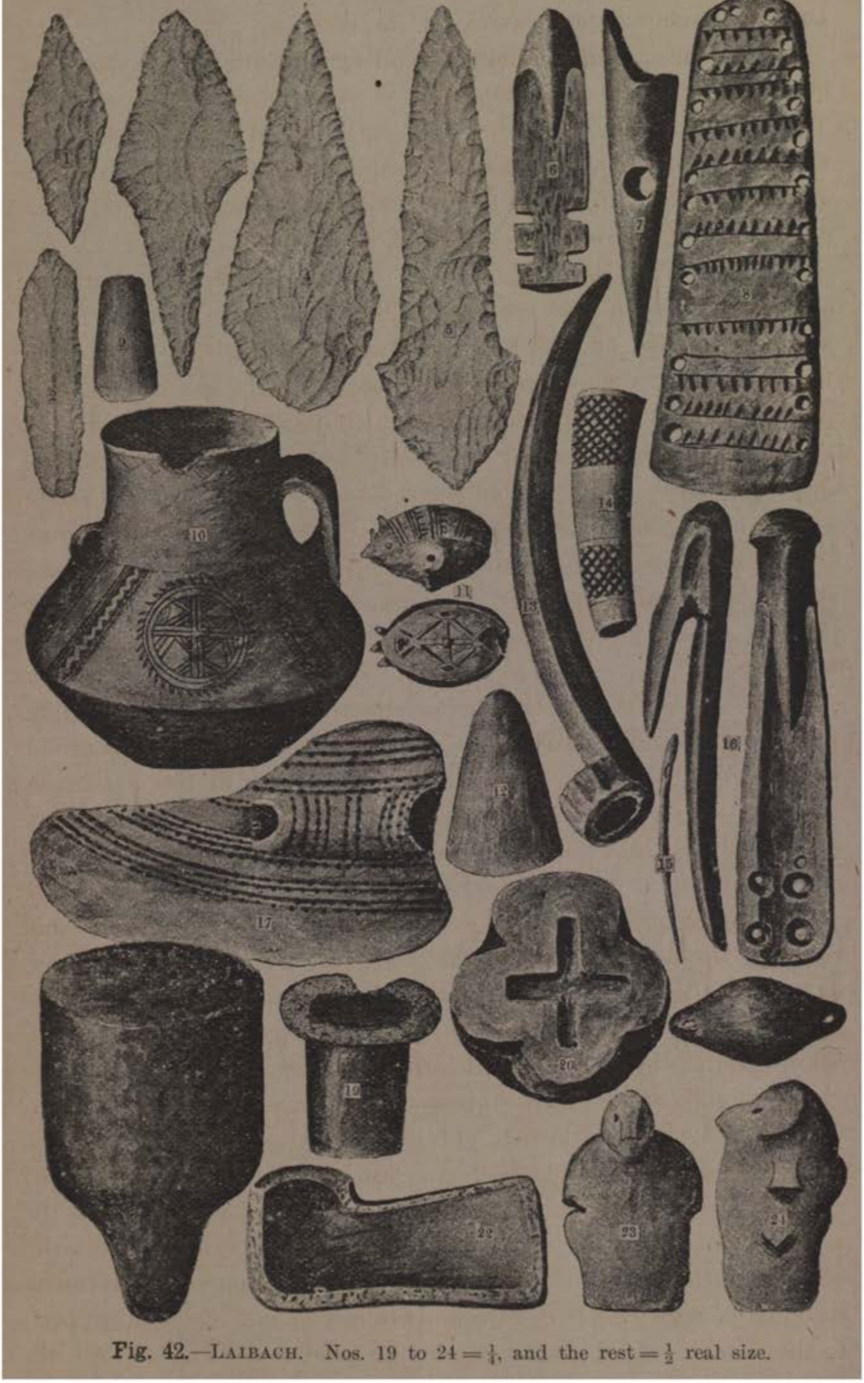
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Fig. 42.—Laibach. Nos. 19 to 24 = $\frac{1}{4}$, and the rest = $\frac{1}{2}$ real size.

pottery, both in manufacture and ornamentation, to that represented in Dr. Schliemann's works on Troy.

Besides the ordinary dishes, there fall to be enumerated under this heading some two or three hundred spindle-whorls, one or two cylindrical weights, perforated cones (**Fig. 43,** No. 5), a few crucibles of superior workmanship (**Fig. 45,** No. 14), a mould for an axe-head (**Fig. 42,** No. 22), and some other small objects, apparently toys (**Fig. 42,** No. 21). Among the most remarkable and mysterious objects are some ornamented images, more or less fragmentary, of animals and human beings with fantastically-formed heads (**Fig. 42,** Nos. 11, 23, and 24; and **Fig. 195,** Nos. 5 to 8).

Stone.—The stone implements, with the exception of rubbers, hammers, and sharpening-stones, are comparatively rare. The sharpening-stones are well represented by a variety of implements—from the small portable hone with a string perforation, to a large hollow block weighing 220 pounds. Of simple stone axes and chisels there are only about a dozen good examples, but amongst them are two little gems—one a hatchet of nephrite (**Fig. 42,** No. 12), and the other a miniature chisel of greenstone (No. 9). Perforated axe-hammers number about two dozen (**Fig. 43,** No. 10); they are mostly of serpentine and well shaped, and the boring is neatly executed. The flint objects, which amount to about four dozen, consist chiefly of neatly-formed lance-heads; but amongst them are a few scrapers and flakes, but hardly one that could be called an arrow-point (**Fig. 42,** Nos. 1 to 5). Almost unique are two conical anvils, one of which (No. 18) has metallic particles of copper or bronze on its flat surface. There is also a polished stone disc showing the commencement of a perforation near its centre with the core still remaining.

Bone and Horn.—A characteristic feature of the Laibach settlements is the abundance of implements of bone and horn which they have yielded, and which may be thus classified:—

1. Perforated hammer-axes of staghorn, numbering between 300 and 400, in all stages of manufacture. The most typical forms of these implements are sketched on **Fig. 44.**

2. Polished daggers, pointers, chisels, etc., varying in length from 4 to 10 inches, amount to many hundreds. The smaller pointers, awls, and pins, were made of bone splinters and ground to fine points. The finer daggers were invariably made of the

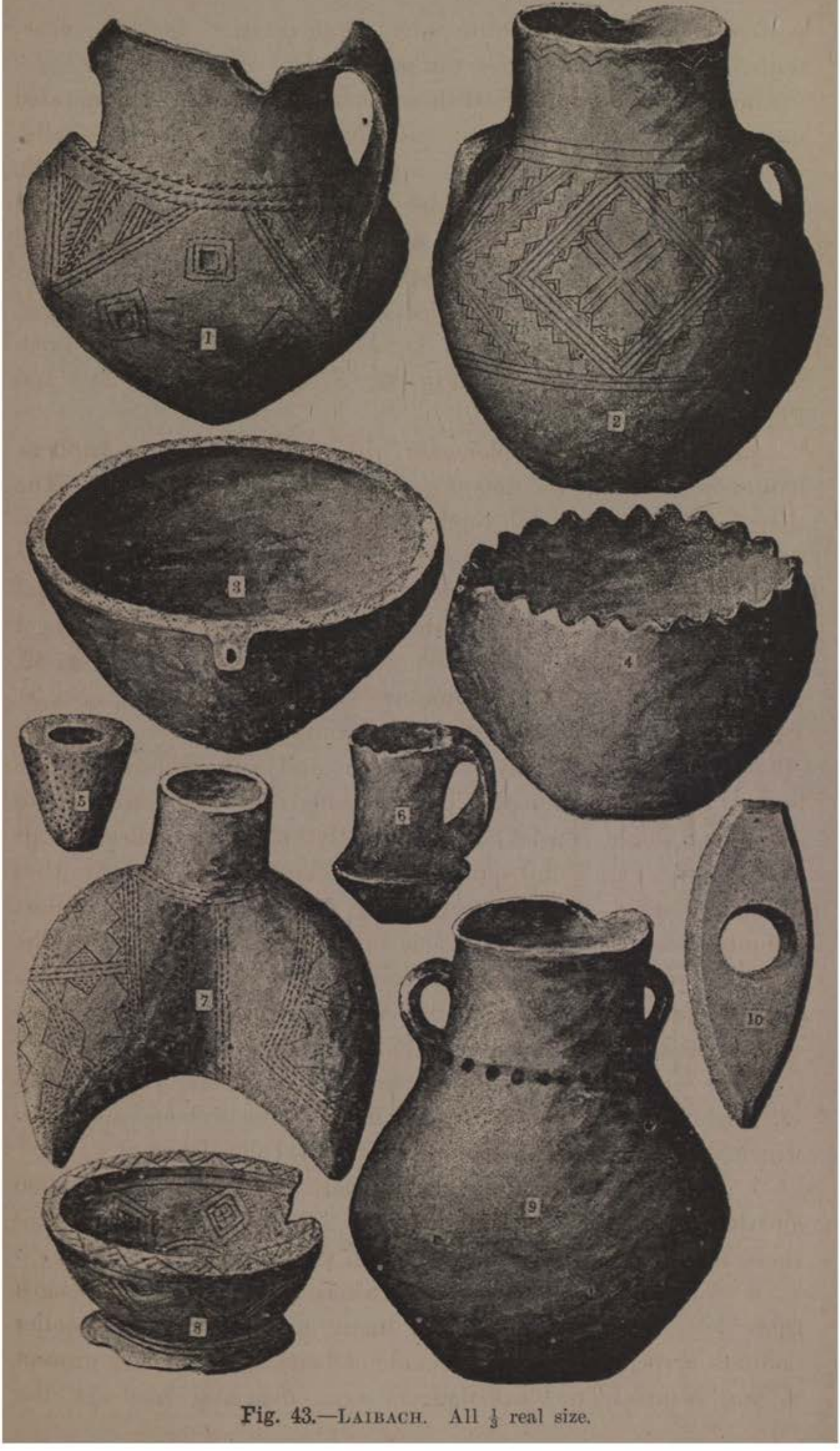
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Fig. 43.—Laibach. All $\frac{1}{3}$ real size.

leg-bones of a deer or other animal. It appears that they were manufactured by sawing or cutting the bone lengthways and slightly diagonally, so as to have two weapons out of the one bone, leaving each with a joint for its hilt. One or two bones were found showing this operation in an uncompleted stage. Some of these daggers had perforations near the extremity of the handle-end for suspension.

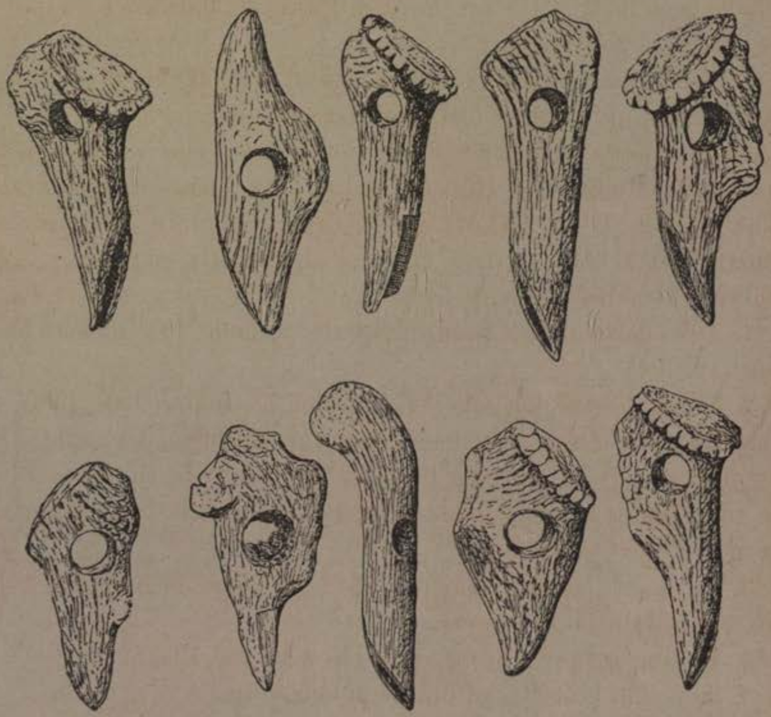

Fig. 44.—LAIBACH. All about ⅓ real size.

3. The tynes of deer-horns were converted into coarse needles (**Fig. 42,** No. 13), and used probably in the manufacture of nets. Over a score of these implements have been collected.

4. A few finely-polished objects like hooks are supposed to have been used as dress-fasteners or buckles (Nos. 6 and 16).

5. Another set of curious objects (No. 7), of which about a score have been collected, is supposed by Dr. Deschmann to have been used as artificial bait to catch large fish, just as we at the present day use an imitation minnow. They are made of the tynes of deer-horns, and vary in length from 2 to 5 inches.

6. About a dozen or so of very sharp and finely-polished needles made from the superficial lamina of a rib. The eye, which is at one end, is either round or elongated (No. 15.)

7. Several hollow bones (some of the wild swan), open at both ends, and varying in length from 5 to 10 inches, have marks inside, as if made by the friction of running threads. They are supposed to have been used in the preparation of thread, and hence go under the name of "Zwirndreher."

8. Some flat portions of the horns of the elk and the under-jaws of oxen, minus their teeth, were used as polishers.

Metal Objects.—(**Fig. 45.**) The total number of metal objects now in the Museum at Laibach, and tabulated as coming from the lake-dwellings, is 24. They are all either of bronze or copper, as hitherto not a trace of iron has anywhere been met with. The following is a list of them:—

1. Two flat-handled bronze swords 21 and 14½ inches long (Nos. 3 and 4).

2. Three bronze daggers, 11½, 8, and 7½, inches long (Nos. 2, 1, and 7). The larger has four rivets for fastening a handle; the next has six rivets, and the blade is beautifully ornamented; and the third has two rivet-holes, arranged differently from those in the other two.

3. A winged bronze celt (No. 5); and one of the flat type (No. 9), said to be of copper.

4. Portions of three bronze pins (Nos. 12 and 13).

5. Two thin bracelets of bronze, much worn.

6. Five peculiar objects of copper, like awls (Nos. 6 and 8).

7. Seven objects like daggers, lance-heads, or knives, rudely hammered, are also supposed to be of pure copper (Nos. 10 and 11).

The winged celt and the larger of the two swords are not noticed in either of the reports of the various investigations, but I am assured they form part of the same find; and, in corroboration of this, I find they are included in a photograph issued by the authorities of the Museum, purporting to be a representation of all the metal objects from the Pfahlbauten.

Objects of Wood.—A canoe 15½ feet long and 2½ feet wide was pointed at both ends. Also a toy canoe. Fragments of a few dishes, such as a large plate, a spoon of yew wood, and some bowls—one of which is scooped out of a large round natural protuberance of a tree. A few elongated pebbles rolled in birch

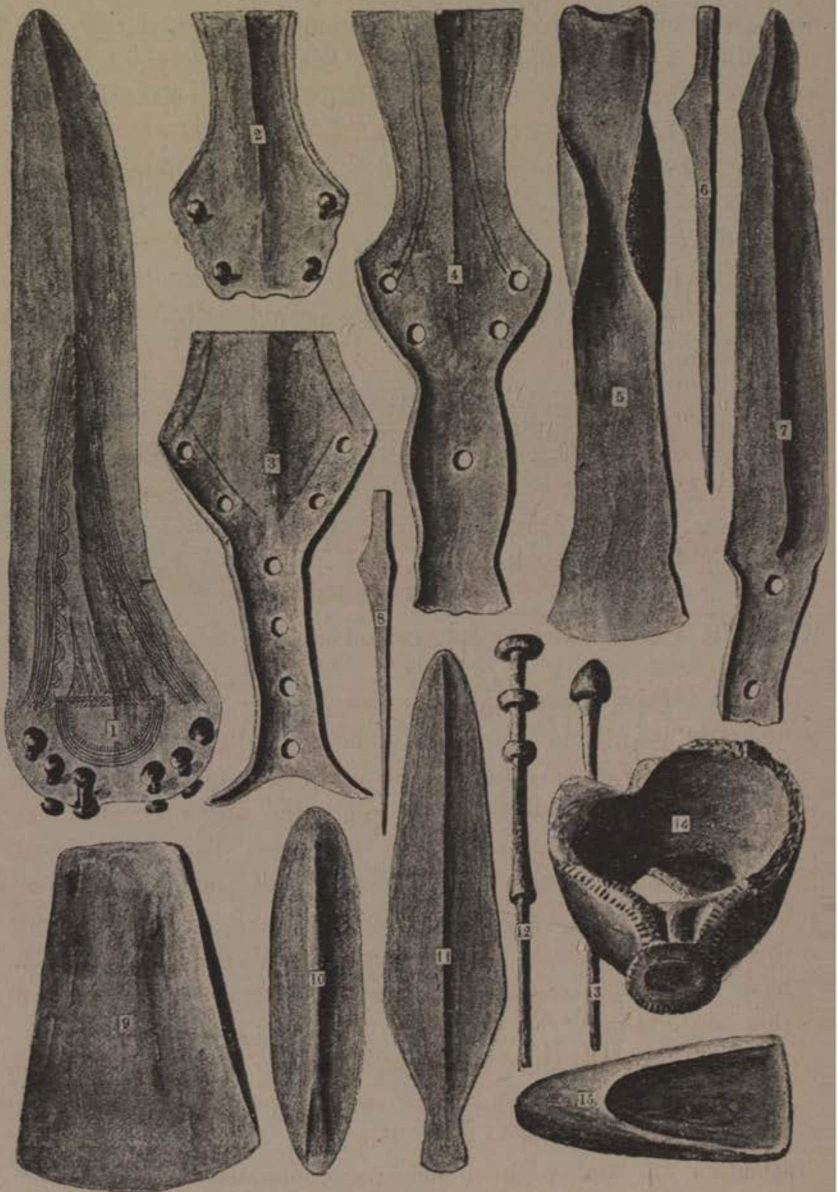

Fig. 45.—Laibach. Nos. 14 and 15 = ¼, and the rest = ½ real size.

bark. Portions of bast ropes, and some coils of very fine carbonised linen threads.

Two remarkable machines ("Biberfälle") (**Fig. 46**), each constructed out of one solid piece of wood, and having two movable valves in the centre worked by projecting pivots resting loosely in corresponding holes in the machine. These valves are freely movable when pushed upwards, but this motion is arrested just a little short of the perpendicular by the slanting shape of their posterior edges, so that, when left to themselves, they always fall together, and never backwards. The one here represented is in a very perfect state of preservation; and the other, though now in a fragmentary condition, clearly shows that in its structure it was precisely similar to the former. These peculiar implements, though found at a little distance, are considered of contemporary date with the lake-dwelling remains, as they were in the same archæological stratum, and about the same depth in the peat. The one here figured is made of oak, and measures 32 inches long, 12 inches broad, and 4 inches deep. The aperture, when the valves are open, measures 9 by 5 inches. The most recent opinion as to the use of these machines is that they were beaver traps—an opinion that derives much probability from the extraordinary number of the skeletons of this animal which have been found among the food-refuse of the inhabitants of this lake-dwelling.

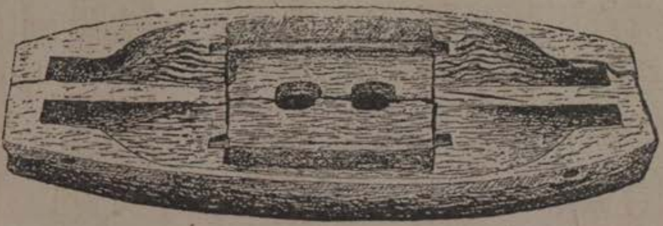

Fig. 46.—Laibach. Wooden machine, supposed to be a Beaver-trap.

Such machines are not absolutely new to archæology, and the little that is known about them rather strengthens the opinion above given as to their use. The first discovered to which attention was directed in archæological journals was figured and described in 1873* by Dr. Hildebrandt, of Tribsees, Neu-Vorpommern. It measures 29½ inches long, and 6 inches broad at the ends, and has two movable valves in the centre. It was found in a peat bog at a depth of 5 to 6 feet below the surface, and is now preserved in the Museum at Greifswald. Dr. Hildebrandt conjectured that it was some kind of trap for catching fish.

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* *Zeit. für Eth.*, vol. v., *Verhand.*, p. 119.

In reply to Dr. Hildebrandt's notice of the machine found at Tribsees, Professor F. Merkel, of Rostock, wrote to say* that two similar ones were found in different parts of North Germany, which he considered to be otter traps rather than fish traps. One of them was found in the moor of Samow, near Gnoien, at a depth of 6 or 7 feet, and is now in the Museum at Rostock.

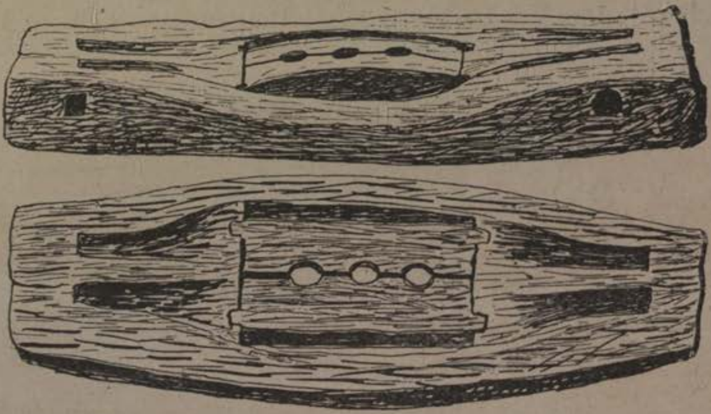

Fig. 47.—Wooden machine, 3 feet long, from North Germany.

It is remarkably like the one from Laibach, and differs only in being 4 inches longer, and having three holes in the valves instead of two (**Fig. 47**). A third† was found in a moor at Friedrichsbruch, near Flatow, in the province of West Preussen, which was sent to the Märkisches Museum. At no time within historical times were such machines known to be in use, so that their function still remains conjectural, unless the circumstantial evidence derived from the Pfahlbau at Laibach decides them to be "Biberfälle."

[While the proofs of the above remarks were still in my hands, I received from Dr. Luigi Meschinelli, of the Geological Museum of the Royal University of Naples, a copy of an article by him, entitled "Studio Sugli Avanzi Preistorici della Valle di Fontega."* The objects described in this memoir were found, in the course of excavating peat, in a small valley which opens into Lake Fimon in the vicinity of Vicenza. Among numerous industrial remains of man, consisting of fragments of pottery, various implements of stone and flint, a bronze celt, and a Roman coin of the time of the Emperor Adrian, were three curious and novel objects of wood shaped like small canoes. One of these machines—the best preserved, though not the largest—is carefully described and figured by Dr. Meschinelli, and from his minute description there can be no doubt it is another example of the same apparatus which I have just described as having been found in North Germany and Laibach Moor.

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* *Zeit. für Eth.*, vol. vi., *Verhand.*, p. 180, 1874.

† *Ibid.*, vol. ix., *Verhand.*, p. 168.

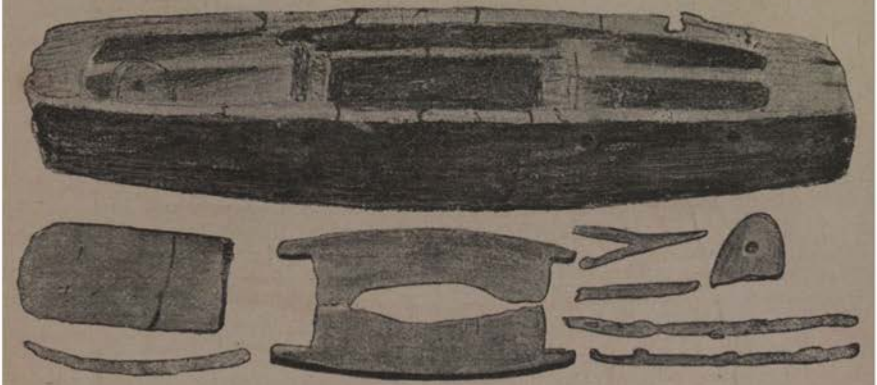

Fig. 47*a*.—Wooden machine from FONTEGA, 28 inches long, with detached valves, and some worked sticks found along with it.

The body of the Italian machine was constructed out of one piece of oak, and measured 28 inches long, 6¾ inches broad, and 2¾ inches thick (**Fig. 47***a*). The opening in the centre, which was closed by two valves revolving on projecting pivots, and resting along their axis in a deep groove cut on each side of the machine, measured 6½ inches by 3½ inches on the under side, so that this would be the actual size of the aperture when the valves were open. Associated with the machine, as will be seen from the illustration, were several worked portions of sticks, evidently the *debris* of some kind of mechanism attached to it. Similar sticks were found along with the Laibach examples. It will be observed that the dimensions of the

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* *Atti della Soc. Veneto Trentina di Sc. Nat.*, vol. xi., 1889.

Italian one are a little less than those of the previously described machines, but that in all other respects they are identical. The other two found at Fontega were, according to Dr. Meschinelli, precisely similar to the one he describes.

Among the organic remains from these peat excavations I find no mention made of the osseous remains of the beaver, neither is this animal included by Lioy among the fauna of the lake-dwellings at Fimon. So far, therefore, there is no presumptive evidence that the machines described by Dr. Meschinelli were *beaver-traps*. That, however, the beaver frequented the Po valley during prehistoric times we have positive evidence in the discovery of its bones in several localities—as, for example, the terremare of Castellaccio (B. 457) and Cogozzo (B. 389a).

Puzzled to account for these curious machines which so fortunately attracted the attention of Dr. Meschinelli, he concludes his notice of them thus:—

> "A che cosa poteva servire questo oggetto? Era forse un modello per costruire poi una piroga di dimensioni maggiori per utilità pratica? Portata a queste dimensioni, serviva essa al trasporto, o meglio quei congegni erano stati inventati a facilitare la pesca? Volle invece l'artefice sbizzarrire il suo genio inventivo nel costruire un trastullo cosi grazioso? E perchè allora costruirne due di eguali?"

It may be interesting to add that in 1859 a wooden machine, which evidently comes under the same category as the above, was found in a bog in the townland of Coolnaman, parish of Aghadowey, county Derry, Ireland. It is figured in *The Ulster Journal of Archæology* (vol. vii. p. 165), as an "antique wooden implement," which is thus described by the editor:—

> "It was discovered embedded in a solid bank of turf, at a depth of 4 feet from the surface, the bog extending to a great depth underneath. No other article was found near it. It is entirely of wood, and measures as follows:—Extreme length, 3 feet 5 inches; breadth across the centre, 7½ inches; depth, 2½ inches; lid, 14 inches long and 3½ inches broad; under hole, 12¾ inches long and 3½ inches broad. The upper edges have evidently been higher on all sides, when perfect —probably on a level with the lid or small door—or even extending still higher, so as to form a kind of trough. The lid is now somewhat narrower than the opening which it is intended to close, but, no doubt, was made to fit accurately when in use. It moves up and down on a hinge formed by two projections which lie in corresponding hollows,

and seems to have been opened and shut by means of a handle inserted into a hole in its centre. These hinges have, no doubt, been kept in their place by some part of the wood above them which is now lost. From each end of the lid and on a level with its upper surface there runs a hollow groove, sloping regularly downwards to the end of the implement, and terminating in a hole which perforates the bottom, seemingly for the discharge of a liquid. Towards each end are two lateral holes placed opposite to each other, one in each lip of the groove, apparently to receive a rope passed through them to serve as a handle for removing the article from place to place. The under side of the implement is flat, having in its centre an oblong hole (the bottom opening of the cavity covered by the lid), which has all its four edges sloped or bevelled. . . . Coolnaman, which gives name to the townland, is a considerable hill, entirely cultivated, but surrounded at its base by a bog of unknown depth, which evidently occupies the site of an ancient lake. On the side of the hill where the implement was discovered the turf has become quite solidified, and forms a dense black mass up to the surface."

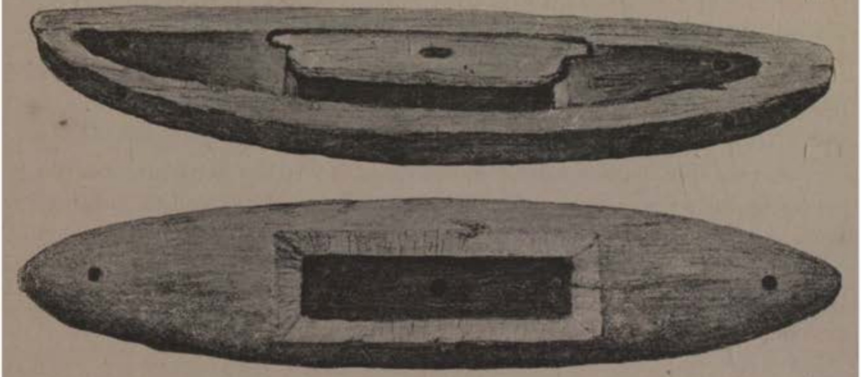

Fig. 47*b*.—Antique wooden implement from Ireland, showing upper and under surfaces. Length, 3 feet 5 inches.

In looking at **Fig.** 47*b*, which shows the upper and under sides of this implement, it will be at once seen that it differs from the Continental examples only by having one valve or lid closing the central aperture instead of two. Neither the editor nor any of the parties who had examined this curious machine at the time had ever seen anything of the kind before, and no rational explanation of its use has ever since been offered. One thought it was a fish-trap intended to be placed in a river; another, that it was a kind of pump; a third, that it was a machine for making peats; and a fourth, that it was a cheese-press (*Ibid.*, p. 289).

To find so many of these machines, of unknown use and so remarkably similar in structure, in such widely separate districts as Ireland, North Germany, Styria, and Italy, must be a matter of interest to archæologists, and no one can say that the correct explanation of their use is to be found in any of the suggestions hitherto offered on this point. I may mention one element which may help in the solution of this problem, viz. that all the examples from Italy, Laibach, and Ireland were found in bogs that were formerly lakes. Perhaps this is true in regard to those from North Germany, but the point is not referred to in the short notices which have appeared of them. If these machines are really traps they could only be used in water where the animal could insert its head from below, and among amphibious animals the *otter* and *beaver* are the only ones to which all the conditions involved in the trap theory could apply.]*

Organic Remains.—In the report of the investigations for the year 1877 Dr. Deschmann gives the following analysis of the osseous remains collected, which shows the relative frequency of the respective animals:—

	Individuals.		Individuals.
Sheep, a horned variety	147	Wild Boar	28
Stag	131	Bear	18
Beaver	52	Bison	17
Domestic Ox, with 48 pieces of horn	35	Dog	16
Goat	31	Roe	12
Badger	31	Wolf	2 to 3
Marsh Pig	35	Elk	3 to 4

Some of these bones contained crystals of vivianite, resembling in this respect the osseous remains found on some of the Scottish crannogs, especially that at Lochlee. (B. 373, p. 88.)

The *Bos primigenius* is also represented by a portion of horn 21 inches long. The presence of hazel nuts with gnawed holes also points to the existence of some small rodents, probably the dormouse. One or two bones (metacarpal bone of a deer and an ulna of the bear) are covered all over with groups of peculiarly-striated markings, as if made with a file; but for what purpose, or whether the work of man or of some rodent animal, remains a mystery.

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* Dr. Meschinelli, in reply to my observations on the Laibach machine, the advanced proofs of which I sent to him, rejects the *beaver-trap* theory as a possible explanation of the use of the Fontega machines, but suggests that they might have been used as traps for catching wild-fowl. (B. 469.)

There is also a considerable quantity of the bones of birds, the spine bones of fish, jawbones of large pike, carp, etc., and a portion of the shell of a tortoise (*Emis lutaria*).

Of human remains there are two skulls of adults, minus the facial part, another of a child, a lower jaw, and a few bones of the extremities.

Notwithstanding a minute search, no traces of any kind of corn have hitherto come to light; but we must not therefore conclude that the lake-dwellers were ignorant of agriculture and the ordinary cereals, as grain is so apt to decompose unless it happens to be in a carbonised state. It is, however, probable that the cultivation of grain was not the chief industry of the colony, and that the mealing-stones which were in such abundance must have been used for grinding some other kind of food as well as grain, such as the kernels of hazel-nuts and water-chestnuts. The water-chestnut (*Trapa natans*), according to Deschmann, does not grow at the present time in Carniola; nor has it ever, since the earliest botanical examination of the country by Scopoli, been considered a native plant in the *Flora Carniolica.* In the last century the monks of the Cistercian order, at Sittich, cultivated it in their ponds. Pliny, however, distinctly states that in ancient times it was used as a food. "Thraces qui ad Strymona habitant foliis tribuli equos saginant, ipsi nucleo vivunt, panem facientes prædulcem, et qui contrabit ventrem." (H. Nat., xxii. 10–12.)

Among the vast quantity of osseous remains there is not a single fragment of the skeleton of the horse. On the other hand, it is calculated that the deer is represented by no less than 500 individuals, and the beaver by at least 140. For the latter this is a colossal figure, seeing that the richest station in beaver remains among the Swiss lake-dwellings, viz. Moosseedorfsee, numbers only eight individuals. The animal is now extinct in the country, nor has it ever been mentioned in any of the historical annals of Carniola.

Third Lecture.

LAKE-DWELLINGS AND PILE-STRUCTURES IN ITALY.

On the 20th of July, 1860, M. G. de Mortillet wrote a letter to Sig. Cornalia, president of the Italian Society of the Natural Sciences, at Milan,* in which, while mentioning the discoveries made in Switzerland, he suggested that similar antiquities might be found in the lakes of Lombardy. The reading of this letter led to a discussion which at once elicited one or two statements of archæological importance. The vice-president, Sig. Antonio Villa, recalled the fact that a bronze axe-head and some flint arrow-heads were found in the turf-bog of Bosisio, at a depth of 10 feet, which were described and figured in a Milan journal, *Il Fotografo*, 2nd August, 1856. The president also mentioned that he possessed weapons of a similar character, which were found, along with some human bones, in the peat-beds of Brenna. Shortly afterwards the celebrated naturalist Gastaldi, in an article in *Il Nuovo Cimento*, directed attention to certain antiquities which the turf-cutters were in the habit of finding in the "torbiera di Mercurago." (B. 37.) Subsequently Gastaldi visited this locality, and along with Professor Moro, of Arona (who first recognised the importance of the objects in question), made further researches in the peat at Mercurago, the result of which was to leave no doubt that they had here to deal with the remains of a true palafitte analogous to the pile-dwellings in the Swiss lakes. During the next two years Gastaldi's report was considerably enlarged by further finds at Mercurago. (B. 43 and 52.)

About the same time that these discoveries at Mercurago were being made the existence of a palafitte in Lake Garda was surmised from the finding, at various times, of bronze implements and weapons in the harbour at Peschiera; but nothing further of a very definite character occurred till the summer of 1863, when Professors Desor and De Mortillet visited Lombardy in search of lake-dwellings. These eminent archæologists were joined by Professor Stoppani, and the immediate result of their investigations was the discovery of several settlements in the Lake of Varese and elsewhere. (B. 67.) Since then the lacustrine stations south of the Alps have greatly increased in number, there being now scarcely any of the smaller lakes and turbaries of North Italy that have not yielded more or fewer remains of this character.

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* *Atti della Soc. It. di Sc. Nat.*, vol. ii. p. 177.

In addition to these ordinary lake-dwellings, whether in water or in peat, there are, in the valley of the Po, other ancient remains known as "Terremare," which are now shown to be so closely analogous to the former that they fall to be described as land palafittes. They are found only in the eastern part of the valley, and as some of their relics, in common with those of the adjacent palafittes, present some characteristics which are not found in western Lombardy, I fasten on this distinction as a convenient principle of classifying the lake and peat dwellings into a western and an eastern group, reserving the "terremare" for separate treatment. Accordingly we begin with Lake Varese, whose settlements appear to have been the most important and the most central in the western group.

LAKE OF VARESE.

Lake Varese is irregularly shaped, about 5½ miles in length, and less than half that in breadth. It occupies a somewhat shallow basin, its greatest depth being 85 feet, and, although bounded on the north by high hills, its banks are generally flat or shelving. Its surface is 770 feet above sea-level, and 134 feet above that of Lake Maggiore, to which its surplus water is carried by the Bardello, a stream which has its outlet at the north end of the lake. The district around is rich and well cultivated, except on the south side, where the lake becomes contiguous with an extensive peat-bog called "torbiera della Brabbia." When Stoppani and his illustrious friends, along with Desor's experienced fisher, Benz, commenced their lacustrine explorations in Lombardy, they selected Lake Varese to start with, on account of the suitability of its shores for such structures. On the very first day (21st April, 1863) their labours were rewarded by the discovery of the sites of two settlements—one at the south-east side of the little island then called Isolino, or Isola Camilla, but now I. Virginia,* and the other opposite the village of Bodio.

Professor Stoppani continued his researches after the departure of his friends, and made further discoveries, not only in Lake Varese, but in some of the other lakes of Lombardy. In November of the same year Captain Angelo Angelucci, of Turin, was attracted to the scene of these discoveries in Lake Varese, and henceforth took an active part in the investigation of its palafittes. (B. 63.) Nor must I omit to mention the Abate Ranchet among the list of the early explorers. He discovered in the same year not only a new station on the south side of the outlet, but also, in the following year, two others in the adjoining lake of Monate. (B. 85.) At the end of the first year's explorations we find, from the reports of Stoppani and Angelucci, that no less than six stations were determined in Lake Varese, all situated on its south-western shore. In 1868, when Dr. Camillo Marinoni published a report on "Le abitazioni lacustri e gli avanzi di umana industria in Lombardia" (B. 159), the number had increased to seven. Although no addition has since been made to their number, much attention has been given, especially in these later years, to their investigation. The Sketch Map of Lake Varese (page 189) shows the names and the respective positions of these settlements, which I shall now shortly describe.

Isola Virginia.—This is a small egg-shaped island lying along the west shore, from which it is distant about 80 yards. It is 240 yards long, with a maximum breadth of 100 yards, and contains besides some fine trees, a house with two storeys, the upper of which is converted into an archæological museum, and at a little distance there is a café for the convenience of the numerous visitors that frequent the locality. Its area is nearly 3 acres, and its highest point is barely 8 feet above the average level of the lake.

Piles were discovered in the lake at the south-east side of the island, in a space extending along its margin for about 100 yards, and about half that distance in breadth. Two years ago, when I visited the locality, the heads of piles were readily seen through the water, just cropping above the sandy bottom. In some cases it was difficult to distinguish them from stones; but a poke with the oar or a long stick at once determined which they were. Professor Stoppani, in his first report (B. 67), describes this as a steinberg, but the idea of the whole island being artificial—an idea first suggested by Desor, who found analogous instances in the Rosen Insel, Lake Starnberg, in the little island at Inkwyl, and in the Irish Crannogs—gained strength by the discovery of similar stumps of piles on its north-west side. Although the local antiquaries—Ranchet, Regazzoni, Quaglia, Castelfranco, and others—occasionally visited these lacustrine stations and made considerable investigations, with the result of adding to their private collections, it was not till 1878 that any systematic researches were made with the view of testing Desor's suggestion that the island was a gigantic crannog. This was first attempted by an Englishman, Mr. W. K.

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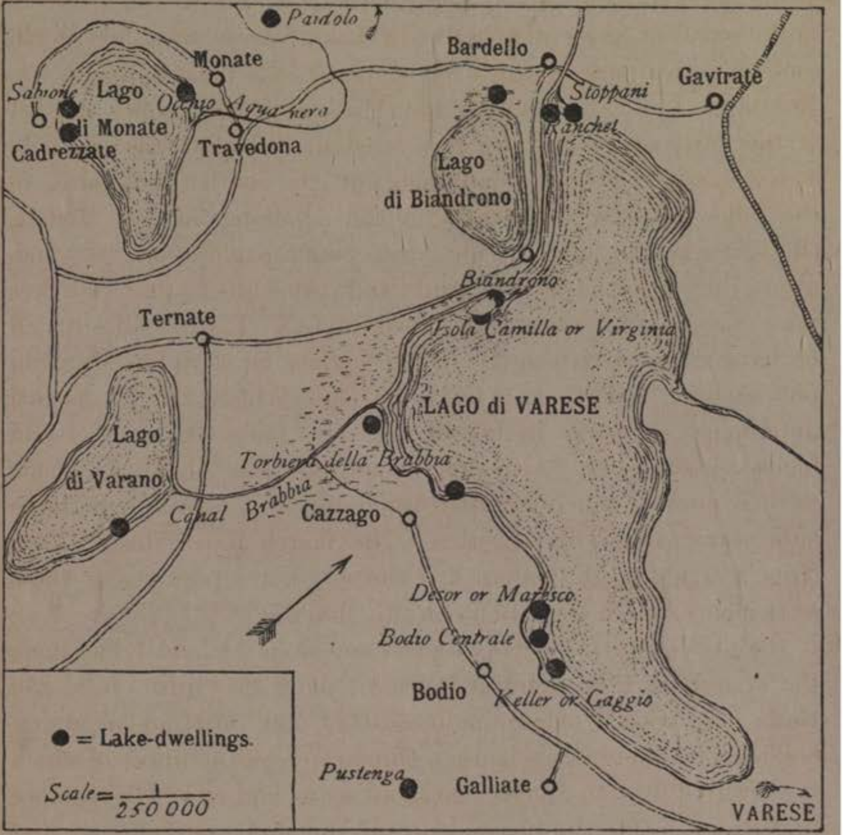
* So called by the Congress of Italian Naturalists who met here in 1878, after Virginia Ponti, wife of the proprietor.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Monate
Bardello
Gavirate
Sabione
Lago di Monate
Occhio
Aqua nera
Stoppani
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Travedona
Lago di Biandrono
Biandrono
Isola Camilla or Virginia
Ternate
LAGO di VARESE
Lago di Varano
Torbiera della Brabbia
Canal Brabbia
Cazzago
Desor or Maresco
Bodio Centrale
Bodio
Keller or Gaggio
Pustenga
Galliate
VARESE
● = Lake-dwellings.
Scale = 1/250 000

Foster, of London, who happened to be residing in the neighbourhood. In carrying out the necessary excavations he had the assistance of Ranchet and Regazzoni, both experienced investigators of lacustrine antiquities. Five trenches, covering on the aggregate about 80 square yards, were dug in different parts of the island, and in all these, piles, fragments of pottery (one of which had the impression of plaited reed-work), and various other relics of human industry, were encountered. In the sections presented by these trenches the following strata were successively passed through:—

1.	Surface Soil for about	14 inches.
2.	Vegetable Mould, of a dark colour ..	10 "
3.	Sand and Gravel	24 "
4.	Sand and Earth, with much organic *débris*	16 "
5.	Sand and Mud (the original lake-sediment).	

The most noteworthy objects collected in these operations were as follows:—In the first layer a Roman coin of Marcus Aurelius, and a portion of a mould for a socketed lance-head (**Fig. 48,** No. 19). In the second, two fragments of bronze. In the third, two polished stone celts, with a portion of a third, and two clay weights. In the fourth, a flint saw with a wooden handle, two bone pins, and some sharpening-stones.

The piles were evidently in their natural position, and the conclusion that the entire island had been a pile-dwelling was irresistible; but the questions when and by what means was the transformation accomplished, were as obscure as before. Mainly for the purpose of clearing this matter, Sig. Ettore Ponti, in September of the following year, gave instructions to have further excavations made in different parts of the island. On this occasion 12 trenches were dug, covering an area of about 230 square yards with an average depth of 3 to 4 feet.

The stratification and composition of the stuff were very similar to those experienced in the former excavations. In this space 440 piles were counted, and Regazzoni calculates that at this rate the original number of piles requisite for the construction of the entire lake-village would be from 35,000 to 40,000. Some horizontal beams were also found among the *débris*. Among the relics the following are noteworthy:—A tyne of deer's horn, with a flint implement inserted into the end of it (No. 3); a small clay weight

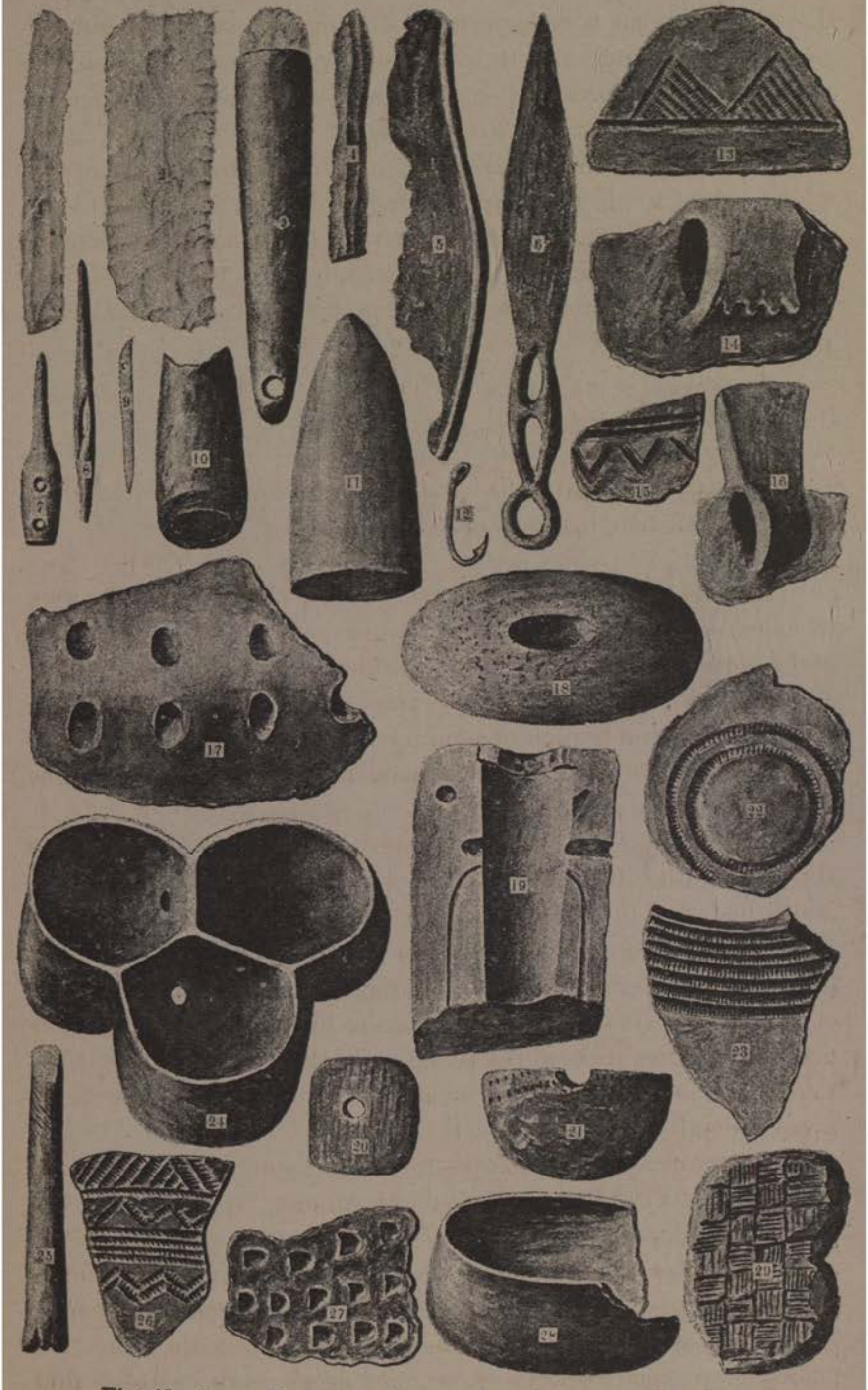
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Fig. 48.—ISOLA VIRGINIA. No. 25 = $\frac{1}{4}$, and the rest = $\frac{1}{2}$ real size.

shaped like a pear; several objects of worked bone, as needles (Nos. 7 to 9), pointers, chisels (No. 25), handles, etc. A knife (No. 5) and a dagger of bronze (No. 6), and two oblong beads of coloured glass with transverse grooves, were found in the stratum immediately below the surface soil.

As a rule, the tops of the piles in these trenches were on a level with the surface of the water, while those in the lake were several feet lower—more or less, according to the depth of water. The cause of this was no doubt the protection given to the former by the accumulation of *débris* around them. It was observed that the uppermost layer alone had yielded Roman coins, but along with them were objects of both the Stone and Bronze Ages—a juxtaposition which might be accounted for by agricultural and other operations to which the island has been subjected in historical times. The fourth, or that which lay immediately over the ancient lake-sediment, was alone exclusively deposited under water, as it contained some entire dishes, and the associated *débris* were just the usual contents of lake-dwelling relic-beds, viz. the shells of hazelnuts, acorns, charred bits of wood, bones of various animals (among others the skull of an enormous wild boar), as well as implements of bone, horn, and flint, pottery, etc. The second and third layers were composed of much the same materials as the fourth, but they appeared to have been the contents of a previously-deposited relic-bed artificially heaped up, as they contained portions of wooden beams which had no definite purpose, but lay in the soil in all directions.

The relics of humanity collected on the Isola Virginia in the course of these various excavations are so numerous that one of the two rooms set apart by Sig. Ponti as an archæological museum for the lacustrine remains of Lake Varese is entirely devoted to their exhibition and preservation, where they have been carefully and neatly arranged under the skilful care of Professor Regazzoni.

Pottery.—As in the other lacustrine stations in this lake, there are two kinds of pottery—one black, and made of fine paste, of which most of the smaller vessels were made; the other is of a greyish colour, but sometimes it has a reddish tinge, and contains a mixture of fine gravel or coarse sand, which gives it a rough appearance. The fragments and entire dishes in the Ponti Museum decidedly testify to considerable skill in the ceramic art. Besides perforated knobs and tubular borings for the insertion of cords (No. 17), there are various forms of handles, as in Nos. 14 and 16, the latter of which is interesting, as it suggests the primary stage of the *ansa lunata* which is such a prominent characteristic of the pottery in the eastern portion of the Po valley.

The diversity of ornamentation is also worthy of notice—raised dots, nail-marks, perforated rims, lines, corrugated grooves, and cord-markings, forming a variety of combinations (Nos. 13, 15, 22, 23, 26, and 27). One bit shows the impression of plaited reed-work (No. 29). Another, an entire dish made of fine black paste, is a curiosity in its way; it consists of three cups united, and having a communication with each other by a small hole in the dividing septa (No. 24). The coarse pottery indicates vessels of large dimensions. There are also loom-weights, spindle-whorls (No. 21), some conical objects pierced vertically (No. 10), and casts of wicker-work, supposed to be the remains of the cottage walls.

Bone and Horn.—Objects of this class are numerous, as polished daggers, pointers, chisels (No. 25), needles (Nos. 7 to 9); also a few perforated teeth.

Stone.—Celts and chisels are fairly abundant, and among them are one or two of jade. Though I noted only one fragment of a perforated axe-head, the art of boring stone was known and skilfully practised, as there are several spindle-whorls and other implements with neat perforations (No. 18). There are also hammer-stones (some with finger-marks), corn-grinders, and polishers. Among the latter are large flat polishing slabs, and a few hand-polishers made like a stone celt (No. 11), which are peculiar to North Italy, if not, indeed, to the Varese lake-dwellers, as I have seen only one other out of the district, viz. at Viadana.

Among the flint objects are knives, scrapers, saws, arrow-points, chisels (like those in **Fig. 68,** Nos. 8, 14, and 15), cores, and a large quantity of flakes (Nos. 1 to 3). For small cutting implements flint was not the only substance used by these lake-dwellers, as there are 36 fine flakes of obsidian (No. 4), and some arrow-heads of rock crystal.

Bronze.—The bronze objects in the museum, including fragments, amount only to 15, and represent knives, fish-hooks, etc. (Nos. 5, 6, and 12).

Amber.—There is also a bit of amber which appears to have been an ornament.

Small square or oblong pieces of wood perforated (No. 20) are supposed to have been floats for nets.

The organic remains collected in the fourth stratum, which was considered to be the true relic-bed of the palafitte, were submitted to Professor Sordelli, who recognised, among other seeds and fruits, the following:—Millet (*Panicum miliaceum*) wheat (*Trit. vulgare*), bramble (*R. fruticosus*), and the vine (*Vitis vinifera*).

Among the bones of animals identified were those of the bear, wolf, badger, beaver, wild boar, stag, roe, etc. The ordinary domestic animals were also represented, and in addition to them I have to mention portions of two human jaws which were found a few inches below the tops of the piles. (B. 324, 326, 341, 343a, 359, and 437.)

Professor Castelfranco (B. 456), who has carefully studied the phenomena presented by these repeated excavations, formulates the following theory as to the succession of events which have brought about the evolution, so to speak, of the Isola Virginia:—

(1) The original palafitte had been destroyed by a conflagration towards the close of the Bronze Age or the beginning of the Iron Age.

(2) Its inhabitants were hunters, fishers, rearers of domestic animals, and agriculturists.

(3) Shortly after the destruction of the pile-village, its subsequent occupiers converted the larger portion of its site—which had already, in parts at least, reached the surface by the gradual accumulation of *débris*—into a veritable island, by heaping over it stuff dug from the margin and especially from the landward side, where there is now a channel separating the island from the mainland. Thus the upper layers contain the *débris* of the earlier people, mixed with sand, gravel, and mud. This view is rendered probable by the fact that in one place, towards the north of the island, the second layer was displaced by an artificially constructed bed of large pebbles.

(4) The newcomers, to whom Castelfranco assigns the transformation of the palafitte into an island, were the Ligurians, whose "sépultures à cineration" are so numerously found in the neighbourhood.

BODIO.—The bay opposite this village contains the remains of three stations, the most southerly of which is known as "Keller" or "Del Gaggio," the next as "Bodio Centrale" or "Delle Monete," and the third as "Desor" or "Del Moresco." All these are comparatively near the shore, being only about 30 yards distant, and the central one is about equidistant—some 800 yards—from the other two. (B. 327, p. 47.) The central station appears to have been a true steinberg, as its area was covered with stones; regarding which Stoppani remarks that formerly they were more numerous, because within recent times some were known to have been removed for building purposes. At first more bronze objects were found on Keller, and more pottery on Desor, while the Centrale was characterised by the discovery on it of a hoard of Roman coins. Subsequent investigations have not borne out these early distinctions based on the character of their relics, and they are now generally acknowledged to belong to the same age.

The coins found on the Centrale were mostly small silver pieces, much decomposed, belonging to the last half-century of the Republic. Stoppani collected about 70, and Angelucci, who explored shortly after him, no less than 128. One found by Regazzoni in 1876 (B. 327, p. 52) has on it, along with the head of Mark Antony, the following legend:—M. ANT. IMP. AUG. III. VIR. R.P.C. M. BARBAT. Q.P., etc., which would make the date about 40 B.C. The hoard is supposed to have been lost or deposited here long after the lake-dwelling ceased to be inhabited—a supposition that is borne out by the fact that the coins were confined to one limited spot, only a couple of yards square. In 1876–7 Sig. Ponti made researches on Desor which greatly enriched his museum both in stone and bronze objects. (B. 327.) A selection of objects from these stations is given on **Fig. 49.**

CAZZAGO-BRABBIA.—This station is situated opposite the village of the same name, and at first it gave such poor results that Stoppani called it a trial station, or an attempt to found a settlement. From the researches made in 1877 it was found to be rich in remains, and exactly similar to those at Bodio. It was, however, farther from the shore, and extended parallel to it for about 150 yards. Its breadth was somewhat irregular, and, judging from the disposition of its piles, it would appear to have been two quadrangularly-shaped stations nearly in contact

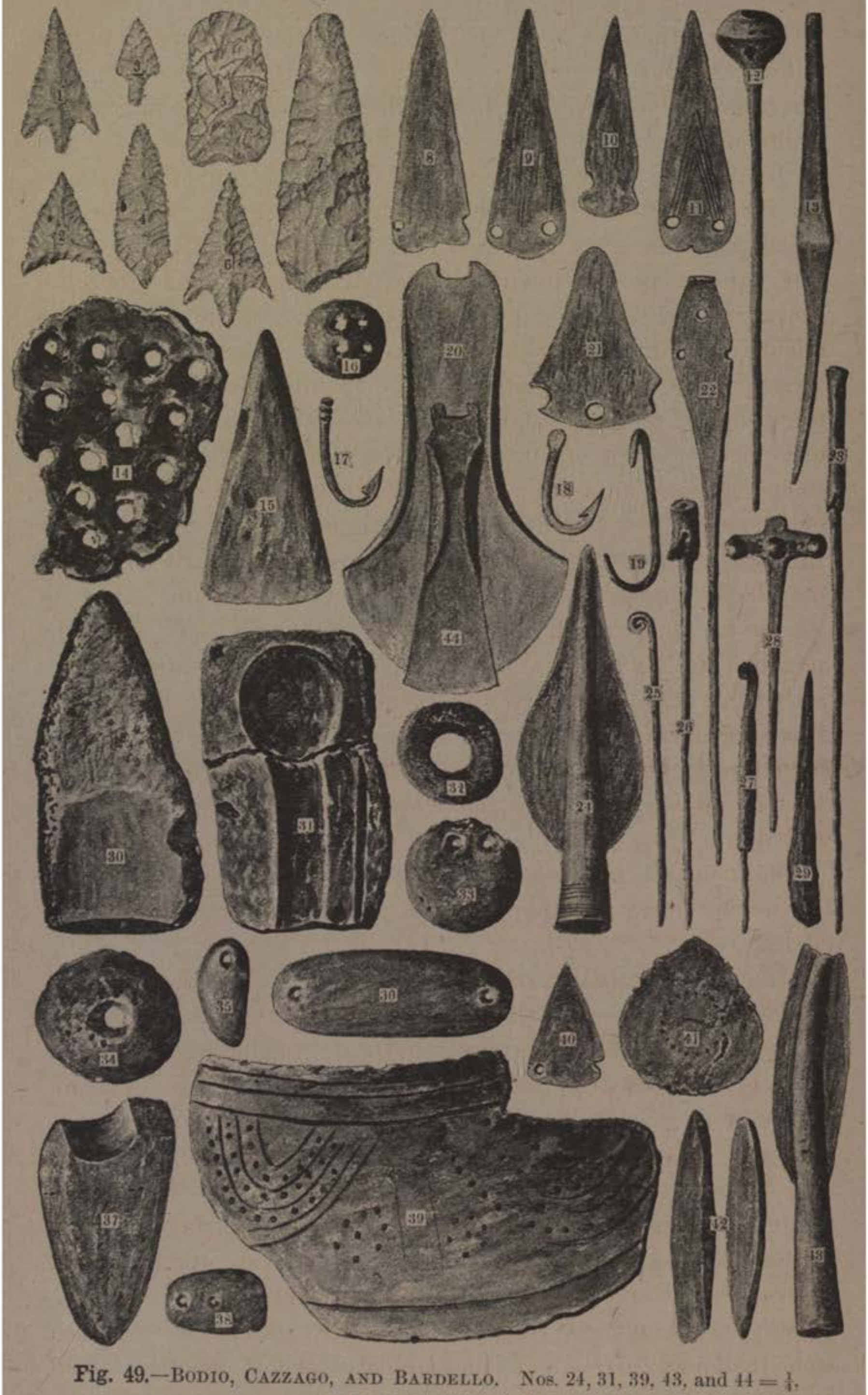
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Fig. 49.—Bodio, Cazzago, and Bardello. Nos. 24, 31, 39, 43, and 44 = $\frac{1}{4}$, and the rest = $\frac{1}{2}$ real size.

with each other. Among the bronze objects collected on this station are four lance-heads, a chisel, an awl, 10 fish-hooks, four hair-pins, a fibula, etc. (B. 456.) There are also some fine arrow-points of flint.

BARDELLO.—Near the mouth of the river are two stations, one on the left and the other on the right shore. The former, called Ranchet, after its discoverer, is a small settlement some 200 yards from the mouth of the river, and 6 or 7 from the shore. It measures about 60 yards long and 50 broad. A large quantity of the bones of domestic animals was found here, as well as some flint and bone arrow-points, spindle-whorls, and various fragments of pottery. Ranchet records also a small lance-head of bronze, a portion of a vase containing some black stuff adhering to it (supposed to be remains of food), and portions of another of fine black paste. The station on the north shore, called after Professor Stoppani, by Regazzoni, is about 100 yards from the mouth of the Bardello, in the direction of Gavirate. It is in the form of a parallelogram, 65 by 45 yards, and, like the previous station, has the piles arranged in parallel rows. Among its relics are:—Bones of the ox, goat, stag, and pig; flint arrow-heads, scrapers, etc., of the usual kind; some bone implements. Two bronze pins and a winged celt are sufficient to show that the station was similar to the others in Lake Varese (Nos. 23 and 44).

Marinoni (B. 159) mentions another station opposite Gàvirate, but neither Regazzoni nor Ranchet could find any traces of it. (B. 327, p. 66.)

TORBIERA DI BIANDRONO.—Lake Biandrono, which formerly occupied a larger area than at present, has on its north-west side an extensive peat-bog, in which Dr. B. Quaglia has discovered the remains of a true palafitte lying under a deposit of about 6 feet of moss. The station is some 200 yards distant from the lake, and of a quadrangular shape, with massive piles scattered over its area. It is remarkable as having supplied objects which might be considered characteristic of all periods—from the earliest polished Stone Age down to that in which knives, spears, hooks, and spurs of iron were manufactured. (B. 327, p. 89.) Other objects recorded from this station are polished stone hatchets; arrow and lance-heads of yellow and dark flint; fragments of pottery, some of which were made of fine paste by the aid of the potter's wheel, and had extremely elegant forms (B. 423, p. 86); two fish-hooks of bone and two oars now in the Museum at Varese. Four curious objects similar to one from Torbiera di Cazzago-Brabbia (**Fig. 50,** No. 18) were found here. (B. 327, p. 87.) These relics have been widely dispersed, some having gone to the Museums of Pavia, Milan, Varese, and Como. An iron spur figured by Regazzoni is in the Como Museum.

TORBIERA DELLA BRABBIA.—Some forty years ago the peasants commenced to cut peats in the extensive turbary which lies on both sides of the canal Brabbia, and it is recorded that objects of antiquity were from time to time found, to which, however, little attention was paid. As early as 1856, Angelo Quaglia directed attention to worked beams in the peat, and since 1863, when such objects began to be more inquired after, other piles were detected in one or two places. The most important of these stations is near the mouth of the Brabbia, on its east bank. Here, during the last few years, many interesting relics have been found. While the usual flint and stone objects (Nos. 2 to 8) are abundant, several others of a more novel character have to be added to the list. Especially noteworthy are some peculiarly-shaped fibulæ (Nos. 9 to 15), one being of iron (No. 12); and a curious object made of bronze rings (No. 18), supposed to be an epaulette, is also from this station. Other objects of bronze are some hair-pins (Nos. 22 to 28), an ornamental pendant (No. 17), a winged celt (No. 21), and a ring (No. 19). There is also one flat celt of copper (No. 20). Among the stone celts and chisels some are now recognised to be of jade. (B. 423, p. 80.) No. 33 represents a hatchet of chloromelanite. Quaglia figures a curious flat stone like a wheel, with a wide circular perforation, and brought to a sharp edge along its outer margin. There were also spindle-whorls of terracotta (No. 29) and a quantity of pottery (Nos. 34 and 35); also two small pendants of amber. Of staghorn there are two magnificent harpoons, one of which is here figured (No. 32). Square bits of wood with central perforations (No. 36) are supposed to have been used as floats for fishing-nets. Among the osseous remains is the skull of a deer with part of the horns attached.

PUSTENGA.—Between Galliate and Doverio, and not very far from the south shore of Lake Varese, there exists in the plain called "Pustenga" a turbary of some 17 acres in extent, which

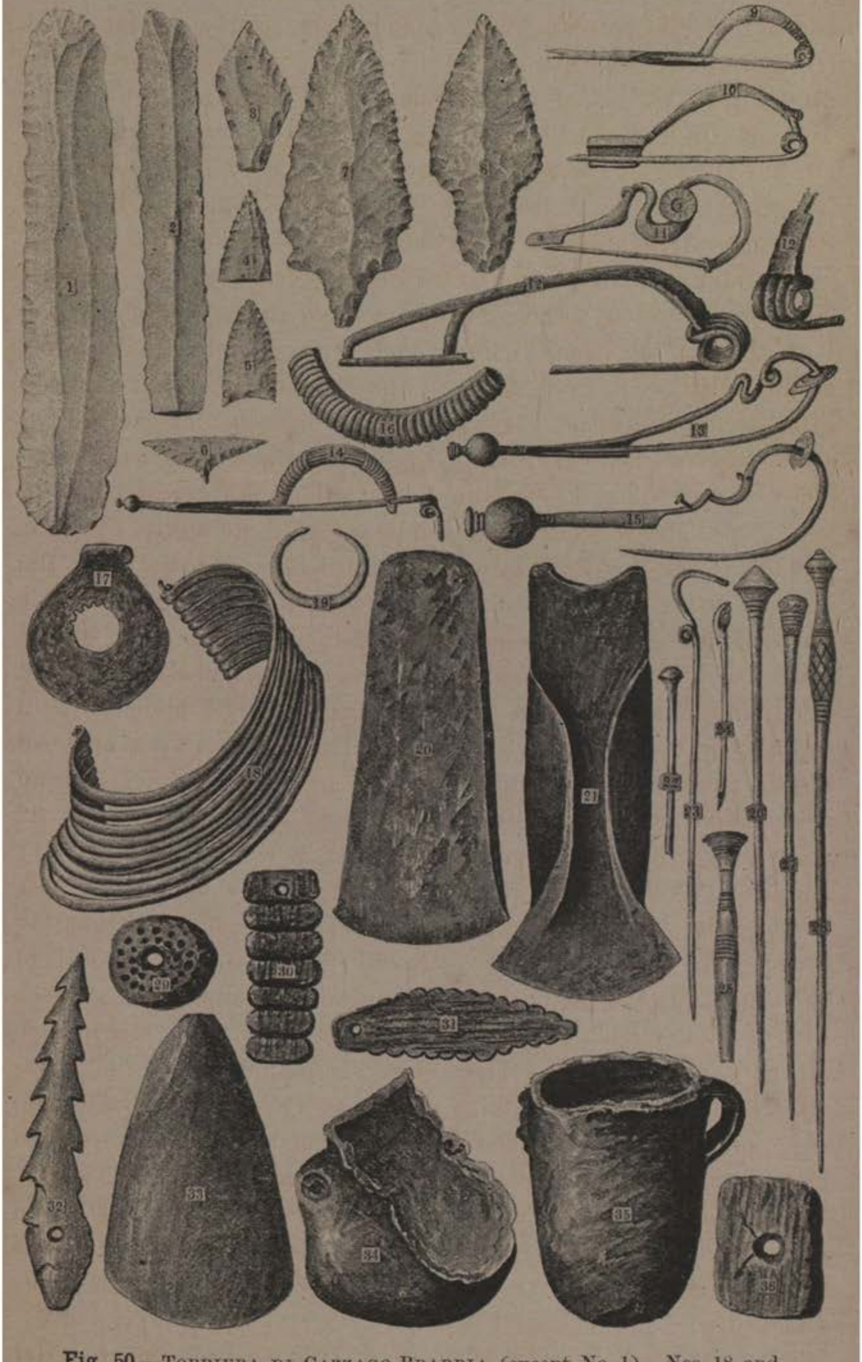
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Fig. 50.—Torbiera di Cazzago-Brabbia (except No. 1). Nos. 18 and 35 = $\frac{1}{3}$, 32 = $\frac{1}{4}$, and all the rest = $\frac{1}{2}$ real size.

was formerly a small lake, and in which G. Quaglia (B. 423, p. 90) has detected the remains of a palafitte. Among the objects recorded from this station are two arrow-points, a knife and a saw of flint, six stone celts, and a large jaw of an ox. Of the stone hatchets four are of serpentine, one of jadeite (?), and one of chloromelanite. The latter is figured by Quaglia. (B. 423, Pl. iv. 45.)

LAKE MONATE.

In the month of April, 1863, Stoppani, Desor, and De Mortillet searched this lake unsuccessfully, and consequently came to the conclusion that it was unsuitable for lake-dwellings ("non potesse offrire piaggia opportuna per le palafitte"). Notwithstanding this opinion, the Abate Ranchet, with the assistance of two local fishermen, succeeded shortly afterwards in discovering the sites of two settlements on the east shore of the lake, near the village of Cadrezzate. (B. 159.) The stations were in water from 6 to 9 feet deep, and about 200 yards apart, and their sites were marked by large mounds of stones ("enormi cumuli di grossi ciottoli"). Fragments of pottery were found in abundance, which in quality of paste and form corresponded with those of the palafittes in Lake Varese. One dish had also a quantity of black stuff, which was supposed to have been the remains of some kind of porridge. A saw, two arrow-points, and a few chips, of flint, and bits of charcoal, were the only objects, in addition to the pottery, collected.

Little was done by way of exploring these stations till the year 1875, when the brothers Borghi, the proprietors of the lake, became interested in its submerged antiquities, and proposed to make further researches. To the experienced archæologist Castelfranco they entrusted the conduct of these researches, and it is to his report I am indebted for the following facts. (B. 321.)

SABIONE.—The most northerly and largest of the two stations at Cadrezzate is about 60 yards from the shore, and occupies a quadrangular space of about 100 yards in length, and rather more than the half of this in breadth. This area was overspread with stony mounds having intervals of from two to four yards between, and for this reason it was difficult to operate with the drag. Piles were found in the intervals between, as well as on, these steinbergs; but Castelfranco thinks the former were the roadways between the huts, which were built on the piles supported by the stones.

The relics collected were similar to those from Varese, of which the following are the principal objects:—

A bronze hatchet (*coltello-ascia*) 5 inches long, and 1 to 2¼ inches broad.

Pottery, including fragments with handles of various forms.

Dishes containing a black crust ("simile al residuo che la polenta lascia in fondo al painolo dopo la cottura") were frequent. Some of this stuff was submitted to Professor Sordelli for analysis, and he thinks, from detecting in it the halves of acorns, that it was a kind of porridge made from this fruit. One thin spindle-whorl 2 inches in diameter had a few punctured dots on its surface, intended as an ornamentation. One flint arrow-point, and a stone hatchet converted into a polisher, like those already described from Varese. There were also shells of hazel-nuts, and the kernels of the cornel cherry.

POZZOLO.—This station was similar to the former as regards the stony mounds, but only about half its size. The principal relics from it were:—

Bronze.—A triangularly-shaped spear-head or dagger 3¼ inches long and an inch broad at its base, where there were two rivet-holes; a hair-pin 3½ inches long, with a ring head; also a fish-hook.

Stone.—A few chips, arrow-points, and a chisel of dark flint; a hammer and polisher of the hatchet-shaped kind.

Pottery.—Fragments of a coarse and fine kind. Vases containing the "sostanza terrosa" already noticed. One bone was found, and in one spot there was a large quantity of cherry-stones.

OCCHIO.—The "Stazione dell' Occhio" is near Monate, and consists of a mass of stones in water from 10 to 14 feet deep; but, notwithstanding the difficulty of searching in such a depth, the following industrial remains were collected:—Chips of flint, charcoal, fragments of pottery, shells of hazel-nuts, and a bronze hook—sufficient to show that it belonged to the same period as the others.

LAKE VARANO, TERNATE, OR COMABBIO.

The previous failure of the early explorers and subsequently of the experienced fisherman known as "Lo Spariss" in their search for palafittes in Lake Varano did not prevent Castelfranco from trying his luck in this lake also. In July, 1878, with the assistance of two fishermen experienced in lake-dwelling researches, he made a tour of the lake (some 5 miles in circumference), and discovered traces of no less than eight stations in different localities, chiefly on the east shore. But the objects, though sufficiently distinctive to show their origin, are too few and unimportant to require any detailed notice.

Professor Castelfranco comes to the conclusion that in both the lakes of Monate and Varano the palafittes are coeval with those in Lake Varese. He is, however, struck with the entire absence of bones from both of them—a fact which appears to him unaccountable. (B. 321.)

TORBIERA DI MOMBELLO.

Between the villages of Mombello and Cerro, on the east shore of Lake Maggiore, and a few miles south of Laveno, there was a small turbary in which Dr. Carlo Tinelli discovered the remains of a palafitte. The peat was being excavated from 1844, but it was 20 years later before the remains of the palafitte were detected. The further progress of the peat-cutting was carefully watched by Tinelli and a priest, Guiseppe Della Chiesa, in the interests of archæology. Some of the piles were extracted, and were said to show marks of having been fashioned by stone implements.

The relics collected here are:—Flint objects in considerable abundance, among which were two saws, a lance-head, and a beautiful knife-flake (**Fig. 50,** No. 1), now in the Museum at Varese; fragments of coarsely-made dishes without handles or ornamentation. Three canoes, roughly made and similar to those from Mercurago, were found at a depth of 8 feet. One of the canoes, 7 feet long, was presented to the Museum at Varese. Along with these objects were bones of the stag, goat, and roe. (B. 171.)

TORBIERA DI VALCUVIA.

In 1870 Professor Leopoldi Maggi described the remains of a palafitte found in "un bacino torboso" between Santa Maria di Cuveglio and Cavona. (B. 187.) This basin lies among glacial *débris*, and was formerly a small lake, but in modern times it became entirely filled up with peat. On the surface there was a layer of vegetable soil 10 inches thick, then spongy peat to the depth of 3 feet, and then a layer of more solid peat about 1 foot

8 inches thick. Underneath these layers was a blackish muddy deposit, extending to an unknown depth, into which the piles were inserted. These piles were from 5 to 10 feet long, and 8 to 10 inches in diameter. They were closely set, and along with them were several beams lying horizontally. The relics consisted of pottery, knives of bronze and iron, charcoal, etc., all of which were dispersed.

TORBIERA DI BRENNO.

Another locality that has yielded interesting remains, of "stazioni palustri," is the "torbiera di Brenno-Useria," situated along the road from Varese to Porto Ceresio, on Lake Lugano. Here, some years ago, a canoe was dug out by the peat-cutters, and associated with it were a large number of weapons of bronze and iron, bracelets, fibulæ (**Fig. 51,** No. 14), bones of domestic animals and of man, but no objects of flint. (B. 327, p. 92.)

LAKE OF LECCO.

As early as 1860 Desor thought he had discovered indications of a palafitte in Lake Maggiore,* but this was subsequently disproved, and up to the present time no remains of these ancient dwellings have been found in this lake. The explanation of their absence in the larger lakes of Italy is to be found in the physical conditions of these glacial and rock-cut basins, which, owing to the depth of water and their rapidly-shelving shores, afford no holding for piles.

Stoppani, in his first exploratory tour, turned his attention to Lago di Lecco as, in his opinion, a suitable locality, and having found a group of piles half-way between the Bridge of Lecco and Malgrate stretching towards the western shore, he concluded this was "una bella palafitta a cui nulla mancherebbe per ritrarre perfettamente quelle della età del bronzo." The only resemblance of this supposed palafitte to those of the Bronze Age was the fact that the tops of the piles projected 1 or 2 feet above the lake mud, as no relics of any kind were found. Further researches have not confirmed the genuineness of this palafitte, and Regazzoni throws out the hint that the piles observed by Stoppani might be the work of modern fishermen, who are in the habit of inserting stakes for fixing their nets and which, among themselves, go under the name of *serrade* or *gueglie*. (B. 67 and 327, p. 70.)

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* *Atti della Soc. It. di Sc. Nat.*, vol. ii.

LAKE OF ANNONE.

In the narrow strait which connects the small lake-basins of Sale and Annone, Stoppani found some piles projecting from a heap of stones in a depth of 6 or 7 feet of water, which he took to be indications of a palafitte. In 1877 Castelfranco (B. 307) re-examined the locality, and came to the conclusion that the submerged piles and stones observed by Stoppani were merely the remains of a bridge which, at some former period, connected the peninsula Isella with the southern shore; and so the matter still rests.

LAKE OF PUSIANO.

More satisfactory discoveries were, however, made by Stoppani in his preliminary tour in the Lake Pusiano, where, at the north end of the Isola dei Cipressi, he recognised the existence of a pile-dwelling. The genuineness of this station has been confirmed both by Castelfranco and Regazzoni, who had subsequently made some investigations in the locality. The industrial remains were confined to a few objects of flint—saws, scrapers, flakes, and arrow-points, a portion of a terra-cotta whorl, and some bones and teeth of animals. In 1877 Regazzoni found piles at the other end of the Isola dei Cipressi buried in a heap of stones. (B. 327, p. 72.)

TORBIERA DI BOSISIO.

To the east of Lake Pusiano lies the torbiera di Bosisio, which came early under the notice of archæologists by the discovery in it, at a depth of 10 feet, of a beautiful bronze axe-head (**Fig. 51**, No. 10). Since then a great many relics have been from time to time found in this peat, but they have been widely dispersed, and as the deposit is now nearly exhausted no more finds can be looked for. Sig. G. B. Villa,* in his descriptive notices of this peat moor, speaks of arrow-points, burnt wood, bits of straw, trunks of trees, etc. Among other things which have been sent to different museums are a bronze spoon (No. 11), (probably of much later date than the other objects), some beautiful arrow-points (Nos. 1 to 7), and a lance-head of flint. An iron hook of modern shape was found at a depth of 3 feet. (B. 327, p. 97.)

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* B. 90, and *Giornale dell' Ing. Arch. ed Agri.*, an. xii.

TORBIERA DI CAPRIANO.

In 1869 Dr. Marinoni described a turbary at Capriano, near Renate (B. 169), in which some remarkable objects of bronze were found at a depth of about 7 feet. Similar objects are prevalent among the relics from the Swiss lake-dwellings, and, judging from what we know of the early Iron Age in Italy, they appear to belong to this period. The find comprised a hair-pin (**Fig. 51,** No. 13), a fibula (No. 18), three bracelets (Nos. 15 and 16), a pendant (No. 17), and a spiral ring (No. 19), all of which are here reproduced from Marinoni's work. (*Ibid., Mem.,* vol. vi. Pl. 1.)

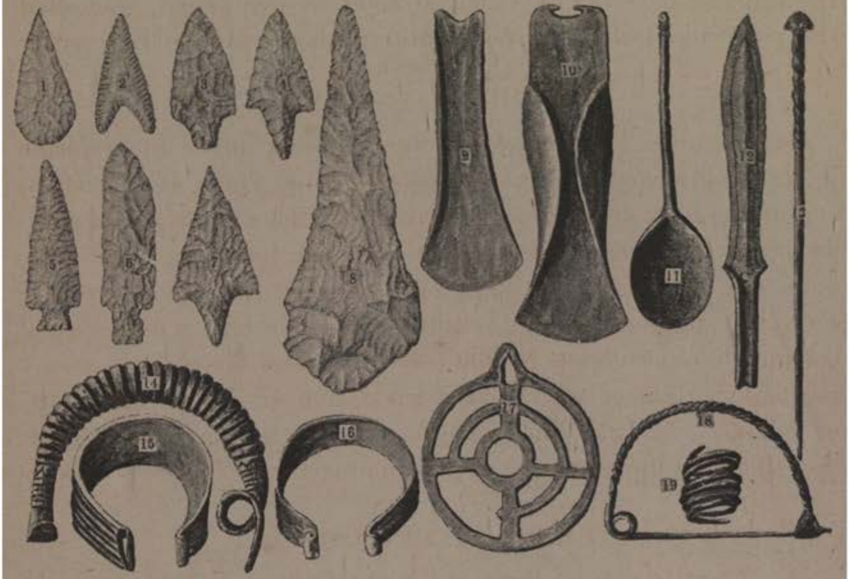

Fig. 51.—Bosisio (1 to 7, 10 and 11), Capriano (13, and 15 to 19), Brenno (14), and Cascina (9 and 12). Nos. 9 to 12 = ¼, and the rest = ½ real size.

TORBIERA DI MAGGIOLINO.

Sig. G. B. Villa, in his "Notizie sulle Torbe della Brianza" (B. 90), describes another locality not far from Bosisio, in the territory of Rogeno, called Maggiolino, in which piles, bones, fragments of pottery, flint knives, and arrow-points, etc., were found—evidently the usual *débris* of a palafitte. (See also B. 327, p. 97.)

TORBIERA DI MERCURAGO.

Since Gastaldi published his first report on the discovery of palafittes in the bog of Mercurago by Professor Moro, many additional objects from this locality have come to light, some of which have been noticed and figured by Gastaldi in his numerous articles on the antiquities of Lombardy. The peat is now exhausted, but from these notices, together with an inspection of the relics still preserved in the Turin Museum, we can have a tolerably correct notion of this the first discovered lake-dwelling in Italy. (B. 43, 52, 91, 168, and 294.)

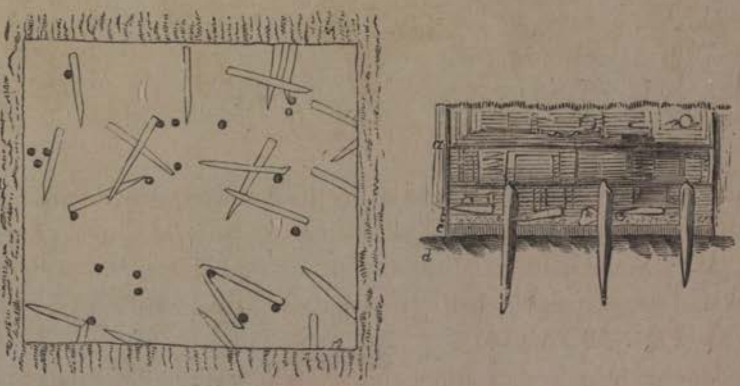

Fig. 52.—Plan and Section of portion of TORBIERA DI MERCURAGO, showing distribution of piles.

The peat basin of Mercurago is of an oblong shape, and the antiquities and piles were in a circumscribed place at its northern end, about 130 feet from the bank. Here in a space of 30 feet square, cleared for antiquarian purposes, were counted 22 piles bound together with cross timbers (**Fig. 52**). The superficial deposit of peat was about 6 feet in thickness, and the tops of the piles reached half-way upwards, while their lower ends penetrated from 3 to 4 feet into the lake mud below. Between this mud and the superincumbent peat there was a bed of fern, and lying immediately over it were three earthen dishes in good preservation, one of which appears to be a lid or cover for another dish (**Fig. 53**), together with a large quantity of the broken fragments of others, a bronze pin (**Fig. 60,** No. 6), a scraper 4¾ inches

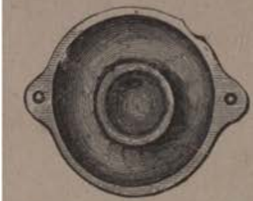

Fig. 53.—Cover of Earthenware Vessel (⅓).

long (No. 7), several arrow-heads (**Fig. 54**), and quite a litter of flint flakes, some shells of hazel-nuts, and stones of the cornel cherry, etc.

The pottery was made of a blackish paste mixed with coarse grains of sand or quartz, and a few dishes were ornamented with patterns of zig-zag scratches separated by parallel lines (**Fig. 60,** No. 13). Some had handles, and others small ears or perforated knobs, two of which had portions of string still attached to them (**Figs. 55** and **56**).

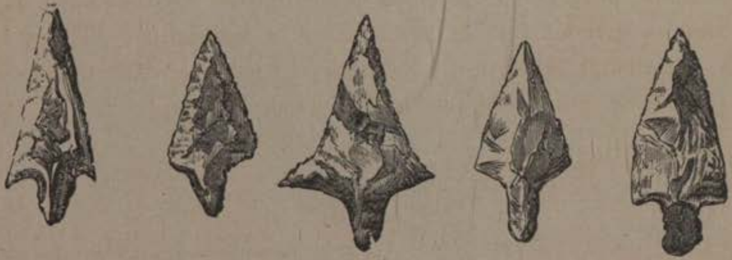

Fig. 54.—Flint Arrow-heads (⅔).

Among other relics from this station were:—Two daggers of bronze, one still retaining a couple of rivets for fixing the handle (**Fig. 60,** No. 1); two bronze pins (Nos. 2 and 4); a wooden anchor 3¼ feet long, terminating at one end with two hooks and at the other with a hole as if for attaching a rope; a canoe 6 feet long, 3¼ feet wide, and about a foot in depth (**Fig. 57**); near the

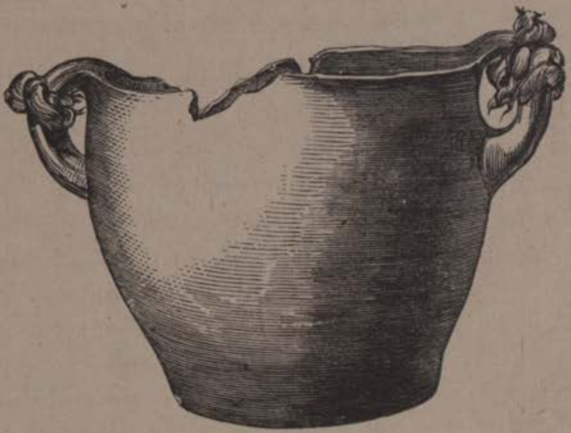

Fig. 55.—An Earthenware Vessel, with portions of string attached to handles (½).

canoe lay a bronze drill (**Fig. 60,** No. 5); and a neat spindle-whorl of baked clay 1½ inch in diameter (No. 22). Among the more recent finds are numerous flint arrow-heads and scrapers (No. 8); a spindle-whorl of soapstone, *pietra ollare* (No. 16); a wooden dish and perforated floats for nets; earthenware dishes of great variety (No. 12); and 16 conical beads of vitreous paste, which, when strung together, formed a handsome necklace (No. 9); and a large cake of burnt clay perforated in the middle (No. 18).

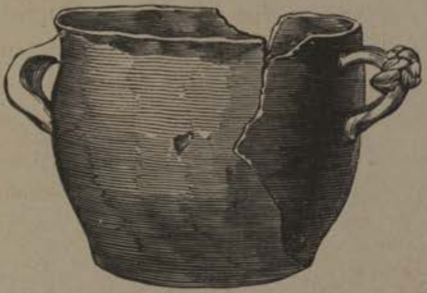

Fig. 56.—Earthenware Vessel (⅓).

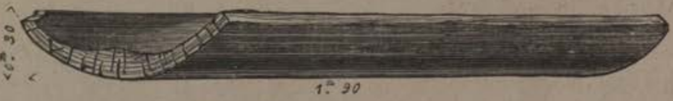

Fig. 57.—Portion of Canoe.

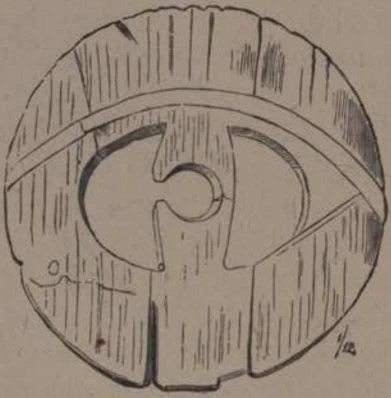

Fig. 58.—Wooden Wheel.

But the most remarkable objects were two wooden wheels. One (**Fig. 58**) was made of three boards kept together with two cross-bars dovetailed into the boards, and in the centre was a round hole having on each side of it a semilunar space. This wheel, which was not quite circular, had an average diameter of 2 feet. The other wheel (**Fig. 59**) was differently constructed. It had six spokes: two of them were made of the same piece of wood as the nave, and their extremities formed part of the rim; the other four, two on each side, connected the fellies with the central piece. The fellies were neatly mortised together and the workmanship was very good. These wheels were so far decayed that they could not be preserved, but casts of them were taken, which may now be seen in the Museum at Turin.

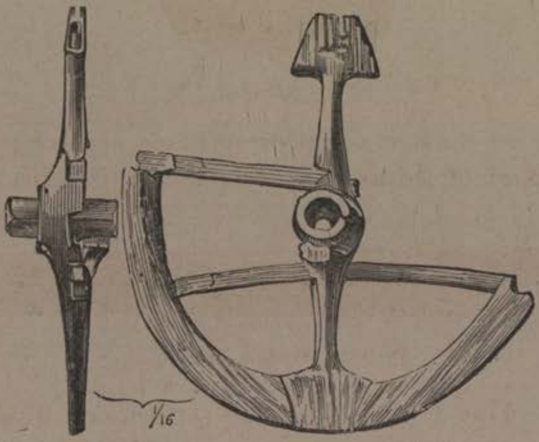

Fig. 59.—Wooden Wheel.

TORBIERA DI BORGO-TICINO, ETC.

Analogous remains to those in Mercurago have been found in several other localities, especially in the districts called Pennino near Borgo-Ticino, and the moor of Gagnano; but the objects were dispersed or thrown away. A stone celt from this place is figured by Gastaldi (**Fig. 60,** No. 19).

In the neighbouring moor of Conturabia a group of piles was observed in the centre of the bog which appears to have belonged to a palafitte of a later date, as some of the piles were said to have been tipped with iron. Gastaldi procured one of these piles, and although this particular one had no iron on it he was convinced that it had been sharpened by instruments similar to those in use at the present day. (B. 52.)

TORBIERA DI SAN MARTINO (SAN GIOVANNI DEL BOSCO).

This morainic basin is situated in the vicinity of Ivrea, immediately to the south of the village of Giovanni, and it also has yielded, from time to time, antiquities which leave no doubt that it was a home of the lake-dwellers. The bog is of an oval shape, about 1¼ mile in length, and half this in breadth, and is beautifully situated amidst groves of chestnut and walnut trees interspersed through rich meadows and fields. On its margin are found the trunks of trees, from 1 to 2 feet in diameter, still attached to their roots and lying just as they had fallen with their points directed to the centre of the bog. These trees are generally pine, oak, hazel, alder, etc.

Below the ordinary peat there is a layer of blackish mud which, on being dried, is combustible, and underneath it lie the stratified layers of ancient lake silt, consisting of a whitish clayey substance. In the blackish intermediate layer there was found, in September, 1864, a canoe 8 feet 4 inches long, 1 foot 9½ inches broad, and 8 inches deep. (A model of this canoe is now in the Museum at Turin.) A few years later (1868) another canoe was found in this turbary, of slightly larger dimensions, having two paddles in it (**Fig. 60,** No. 17). The following objects are, among others, described and figured by Gastaldi as coming from the same place, viz.:—Specimens of pottery (Nos. 14 and 23), one of which (No. 23) is a lid of a vessel precisely similar to the one from Mercurago (**Fig. 53**); flint and stone implements (**Fig. 60,** No. 20); wooden net-floats (No. 21); two bronze pins (Nos. 10 and 11); and a remarkable bronze pendant (No. 15), supposed, however, to be of Etruscan or Roman origin, and of later date than the other remains. (B. 168 and 294.)

Other turbaries in the western districts of the Po that have yielded prehistoric remains, but with which there were no piles or other indications of lake-dwellings, are:—

TORB. DI TORRE BAIRO.—Fragments of vessels made on the wheel. In another small bog a quern-stone was found which is supposed to be of Roman times.

TORB. DI MONGENET.—A bronze paalstab. (B. 294, tav. xiii. 4.)

TORB. DI BOLENGO.—A bronze arrow-point. (*Ibid.*, tav. xiii. 9.)

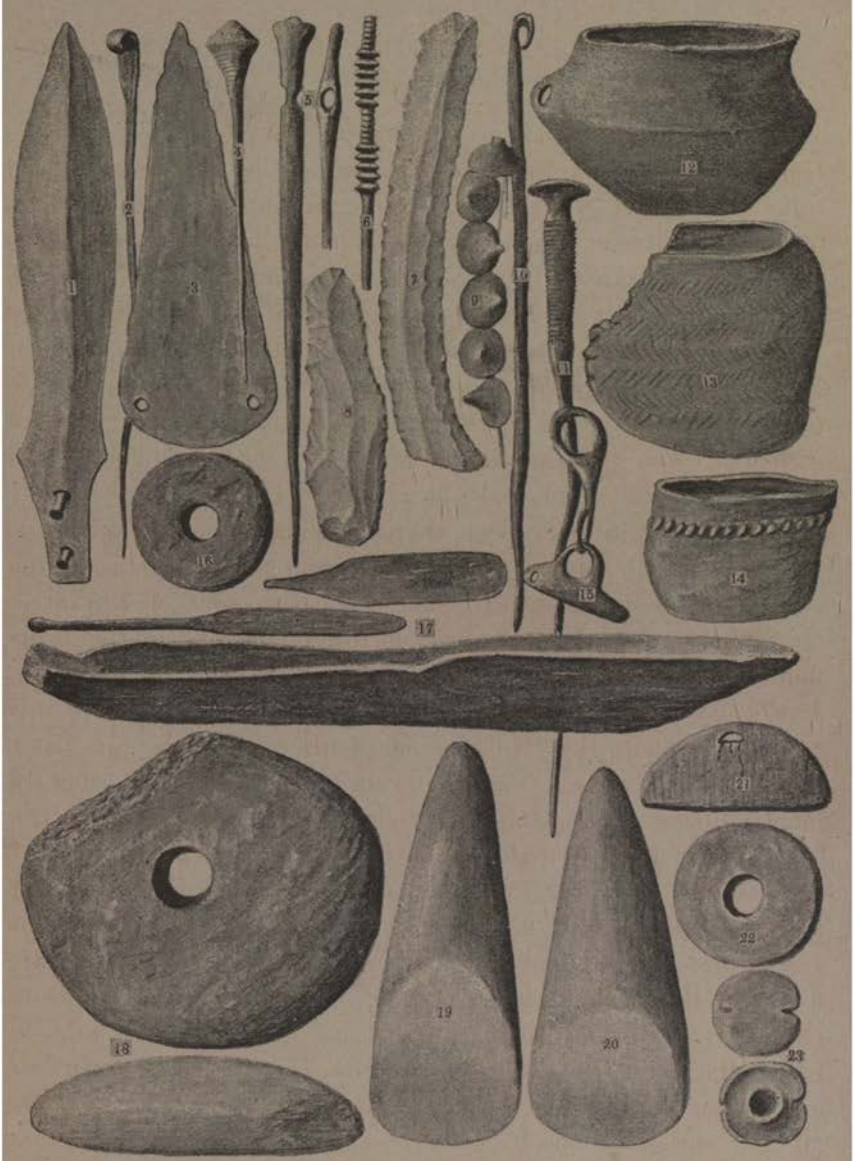

Fig. 60.—Mercurago (1 to 9, 12, 13, 18, and 22), Borgo-Ticino (19), and San Martino. Nos. 12, 14, 18, 21, and 23 = $\frac{1}{4}$, 13 = $\frac{1}{6}$, 17 = $\frac{1}{24}$ (the paddles $\frac{1}{20}$), and the rest = $\frac{1}{2}$ real size.

Torb. di Trana.—A sword of bronze 27 inches long (B. 294, Pl. xi.), and a celt of the flat type. (B. 168, Pl. viii.)

Lago di Piverone.—A bronze sword. (B. 168, Pl. viii.)

Torb. di Oleggio-Castello.—A bronze sword and a socketed spear-head. (*Ibid.*)

LAGOZZA.

Lagozza is the name given to a small natural "bacino torbosa" situated in an undulating plateau of morainic *débris*, about 4 miles from Gallarate in the province of Milan. It is roughly oval in shape and covers a superficial area of 10 or 12 acres. Till recently this basin was a peaty bog, passable in summer, with certain precautions, to "Cacciatori;" but in former times, as its name implies, it was a stagnant lake. In 1875 the proprietor, Count Cornaggio, an ardent and skilful agriculturist, determined to remove the peat altogether, and, for this purpose, commenced operations by cutting a central canal to carry off the water. While the workmen were thus engaged they began to find near the middle of the bog bits of pottery, charcoal, and rotten piles, which, on skilled attention being directed to them, turned out to be undoubted indications of a prehistoric lake-dwelling. The process of clearing out the peat was therefore watched with great interest by local antiquaries, as the operation would involve a more thorough investigation of the antiquities imbedded in the peat than any researches that were likely to be undertaken solely from the scientific point of view. It was not till the spring of 1880 that the main portion of the palafitte was reached by the peat-cutters, and then various antiquarian objects were met with. The turf is now entirely removed, and the relics collected are deposited partly in the Museo Civico in Milan, and partly in the Museo Archeologico at Como.

The pile-dwelling occupied a rectangular space, near the centre of the *bacino,* about 80 yards long from north to south and 30 to 40 yards broad. The turf here varied in thickness from 1 to 2 yards, according to the state of moisture; below which there was a muddy stratum containing the roots of water plants (*fango con radice*), among which the tops of the piles appeared. This layer was 16 inches thick, and immediately below it was the *strato archeologico,* which varied in thickness from 2 to 8 inches, and contained the usual *débris* of human occupancy embedded in a matrix of black peat mud and earth. Below this again was a stratum of black earth, mixed with the whitish clay or marl of the ancient lake bottom, in which the points of the piles were firmly fixed. The piles were pointed at the base and irregularly fixed, 4 or 5 to the square yard, and varied in length from 3½ to 5 feet, with a diameter of 4 to 8 inches. Many prepared beams either of round or split stems, some over 20 feet in length, lay buried in the peat, as if they had fallen from a platform. Regazzoni draws attention to some short beams having a square-cut hole at each end. One of these beams measured 24½ inches long, 4¾ broad, and 3½ thick, and the holes were 2¾ by 1½ inches. The top of a tree whose branches were neatly chopped off at the distance of 6 or 7 inches from the stem was supposed to have been used as a ladder.

Castelfranco thinks the points of the piles were fashioned by some sharp-cutting instrument of metal, as some of the cuts were 11 inches long, and such as no stone weapon could have produced ("non credo che una scure di pietra sia mai stata capace di tanto"). This observation is very significant in face of the fact that there is no object of metal among the relics from Lagozza, with the exception of a fibula (**Fig. 61,** No. 18), found in the lower part of the turf and, therefore, outside the well-defined relic-bed. This fibula belongs to the early Iron Age, and it is doubtful whether it belonged to the inhabitants of the palafitte. The same author also states that where charcoal and partially burnt wood were in greater abundance there also the relics were more numerous, and hence he concludes that the settlement came to an end by a conflagration ("il risultato di un incendio generale o di parecchi parziali").

Among the industrial remains collected from Lagozza pottery takes the chief place. The quality is of two kinds, coarse and fine, the latter having a smooth black appearance and without any admixture of coarse sand. The vessels, of which a considerable number are whole or nearly so, consist of cups, bowls, plates, vases, spoons, etc. They are generally without handles, having, instead, perforated knobs, as may be seen from the accompanying illustrations (**Fig. 62**, Nos. 2, 6, 7, 9, and 15). The plates are sometimes ornamented with panels containing impressions of circles, dots, and lines (Nos. 3, 10, and 13). Some of the larger dishes have conical protuberances or finger-marks round the margin (Nos. 1 and 4).

The spindle-whorls, about 40 of which are in the Museum at Como, are somewhat peculiar, being flat circular cakes of burnt clay with a hole in the centre, and often ornamented with lines or rows of elliptical impressions (**Fig. 61,** Nos. 12 to 17).

There are some clay weights of the usual conical shape, and others kidney-shaped with a perforation at each end (**Fig. 62,** No. 14). In some of these weights bits of straw and grains of barley and wheat have been detected.

There is not a single article made of bone or horn, nor any trace of fishing or hunting gear, with the exception of one or two arrow-heads (**Fig. 61,** Nos. 5 and 6).

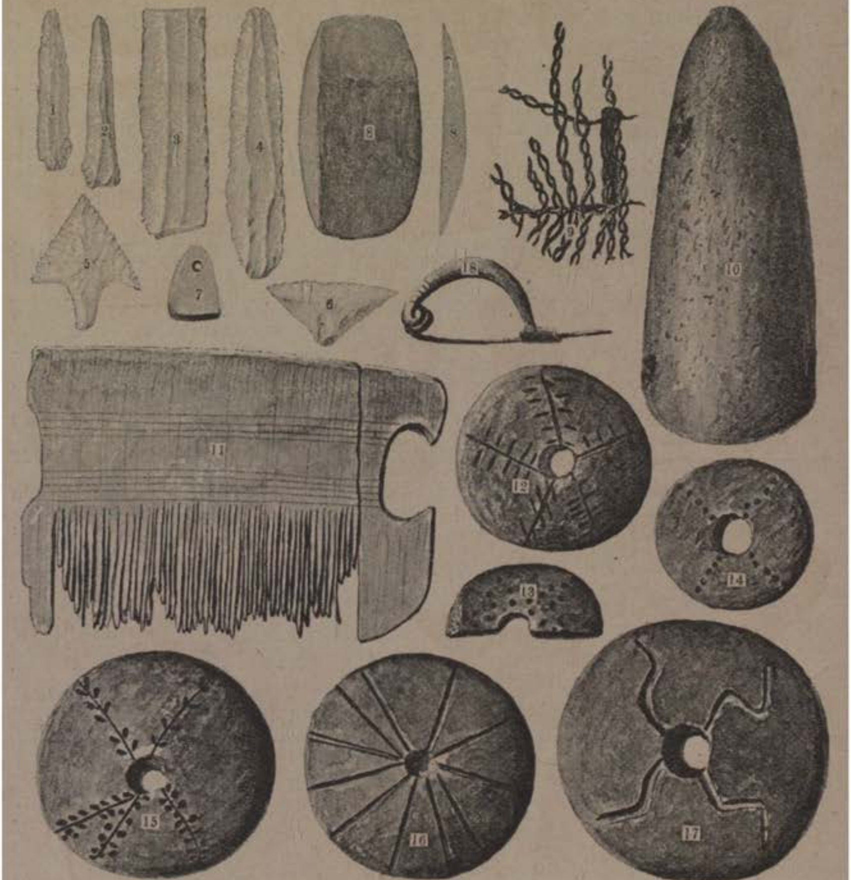

Fig. 61.—Lagozza. All ½ real size.

Stone celts are scarce, only about 30 in all, and none perforated (No. 10). One small implement is in the form of a double-edged axe, and adapted for cutting at both ends (No. 8).

Flint flakes or knives (Nos. 1 to 4) are numerous, but cores and chips are less frequent. Arrow-points are extremely few—only three have I seen in the Museum at Como, but their authenticity seems to be questioned by Castelfranco, who thinks

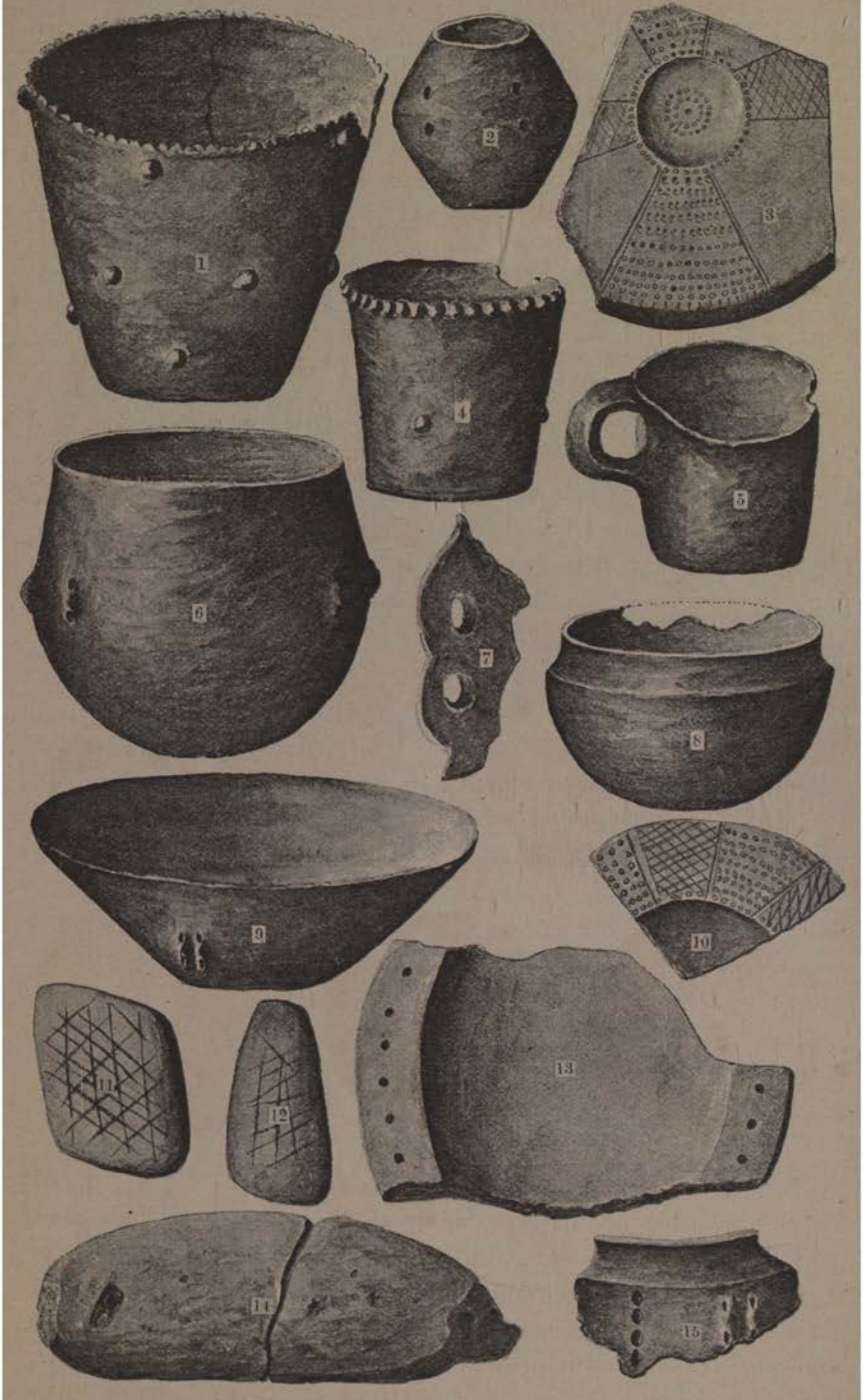
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Fig. 62.—Lagozza. All $\frac{1}{3}$ real size.

they were not actually from the relic-bed in the palafitte. Among the usual stone objects, such as hammers, rubbers, etc., are to be noticed a number of white quartz pebbles and eight or nine small polished stones with scratched markings on them (**Fig. 62**, Nos. 11 and 12).

A wooden comb (**Fig. 61**, No. 11), with teeth at one side, is, I believe, the only specimen from any of the lake-dwellings in Italy.

Ornaments or charms are represented by one small pendant of green steatite perforated for suspension (No. 7).

As evidence that the inhabitants were in the habit of spinning and weaving, there are, besides the spindle-whorls and clay weights, bits of thread and cord, and one small fragment of coarsely-made linen tissue (No. 9). According to Professor Sordelli, this was made from wild flax (*Linum angustifolium*), of which he found the seeds and fibres in abundance, but no trace of the cultivated species. On the other hand, there were two kinds of wheat and the six-eared barley. Among the food-remains were the wild apple, acorns, hazel-nuts, stones of the cornel cherry, poppy-seeds, etc.

But the most remarkable feature of Lagozza is, that no animal bones of any description were found—not a tooth, or horn, or bone of any kind. Neither were there any warlike weapons, with the exception of the few questionable arrow-points. Castelfranco therefore suggests that the inabitants of Lagozza might have been vegetarians. (B. 354, 359b, 372d′, 387, 409, 452, 456, and 459c.)

LAKE GARDA.

In 1851, while the harbour of Peschiera was being deepened, numerous bronze implements, associated with piles deeply buried in the bed of the lake, were found at a particular spot near the north mole of the fortress; but no special attention was paid to them. The bronze objects were laid aside by the workmen, and it is said that a quantity of them, weighing some 15 or 20 pounds, was sold as old metal. Of this find a very few were sent to the K. K. Antiken Cabinet in Vienna. In 1860 further deepening of the harbour became necessary, and again similar objects were found in the dredged-up stuff. These operations were conducted under the supervision of M. Lorenz and Col. von Silber, who, in the interests of archæology, collected and preserved the bronze objects. Subsequently, on its being suggested that this was a palafitte like those recently discovered in the Swiss lakes, Col. von Silber forwarded an assortment of the relics to Dr. Keller at Zürich, with the following explanatory notice of the circumstances in which they were found:—

"In deepening the entrance of the harbour at Peschiera for the newly-built gunboat, which was done by means of a mud-machine (called a 'paternoster') to a depth of 7 or 8 feet below the usual level of the water, the workmen found amongst the mud and sand brought up by the machine a great number of bronze implements. These were carefully preserved, for the sake of archæology, by Mr. Lorenz, the marine engineer, now residing at Pola, and myself. I was so uninitiated in this science, that when I found that the greater part of the objects had been taken up from a space of a very few square fathoms, I had the notion that a ship, laden with bronze, had been wrecked here, and it was not till a conversation which I had with Dr. Freudenberg, of Bonn, that I was led to believe that a lake-dwelling probably existed on this spot. This idea was corroborated by the fact that just in this place the working of the mud-machine was very much impeded by a number of burnt piles which were quite covered with the mud. Unfortunately, I fancied at first that these piles came from the fishermen's huts, which abound in this neighbourhood at the present day, so that I paid no attention to their position or arrangement. The piles which were drawn up were, on an average, 4 or 5 feet long, quite hidden under the sand, and burnt to such a degree that it is quite impossible for me to say with certainty what kinds of wood they were made of. I imagine, however, that the wood was chiefly that of the stone oak (*Quercus ilex*). The piles were 4 or 5 inches in diameter.

"Besides the bronze implements one of stone was found, which I believe to be a sling-stone. Lately, when reading the reports of the Swiss lake-dwellings, I remember the occurrence of a great number of pieces of burnt clay found in the mud. These pieces were of a blackish colour, remarkably thick, and without any definite form. I do not doubt that they have been fragments of the clay covering the huts of the lake-dwellings." (B. 119, 2nd ed., p. 364.)

These discoveries induced the eminent archæologist, Dr. E.

Freiherr von Sacken to visit Peschiera for the purpose of investigating into the reported Pfahlbau. In addition to his own special researches he had correct details of the results already obtained from Captain von Kostersitz, who was present, and carefully watched the excavations during the years 1860–1–2, and from these he drew up an admirable report, published in 1864 (B. 75), which clearly proved that there was here a true pile-dwelling of the Bronze Age.

In this report the following sectional description of the sedimentary strata is given:—

(1) In a depth of about 5 feet of water there was first a sandy layer from 2½ to 3 feet thick in which no relics were found.

(2) Beneath this layer of sand was the relic-bed, from 2 to 3½ feet thick, composed of a mossy deposit containing the remains of plants, organic *débris*, the industrial objects already referred to, and the tops of numerous piles.

(3) Underlying the relic-bed was a thick bed of stiff loam and sand, into which the piles deeply penetrated. These piles were generally of pine and oak, the former predominating in the proportion of two to one.

The dimensions of the lake-dwelling were not accurately ascertained, but the area covered by the dredging operations exceeded 10,000 square yards, and in most of this space piles were found. No stone implements were found, with the exception of the polished discoidal stone sent to Dr. Keller; but the number of bronze objects amounted to 250, most of which were sent to Vienna.

Professor Franz Unger made a careful study of the organic remains, and amongst the various fruits, plants, and wood identified by him the most interesting are rye (*Secale cereale*) and the vine (*Vitis vinifera*). The former has not yet been found in any of the terremare or lake-dwellings of North Italy.

The osseous remains represented the ordinary domestic animals —dog, sheep, goat, ox, horse, and pig—as well as the stag, roe, wild boar, etc.

Besides the bronze objects there were fragments of pottery and one or two Roman coins—one of Trajan and one of Domitian.

Meantime archæologists were on the look out for palafittes in other parts of the lake. It appears that as early as 1861 Cav. Martinati detected piles at a place called Rocca di Garda, near

Bardolino, on the eastern shore of the lake, which he considered to be the remains of a pile-dwelling. Dr. Alberti also discovered similar evidence in two localities farther south, Il Bor and Porto di Pacengo, which he described in a letter to Martinati in 1864. (B. 77 and 355.) This stimulated the Accad. d'Agricoltura, Arti, e Commercio di Verona to appoint a Commission to investigate the matter; but their labours were soon afterwards discontinued owing to the political disturbances of 1866, and it was not till ten years later that these proposed archæological researches were resumed and the Commission re-constituted. Although on this occasion no bronze objects were found, it cannot be said that the explorations were altogether devoid of interest, as the existence of the reported palafittes was not only confirmed, but a considerable quantity of the osseous remains of the ordinary domestic animals, fragments of pottery (including handles known as *anse lunate*), and a wooden spoon were collected. But the Commission soon abandoned the work as profitless. Then it was that Mr. Alberto Cavazzocca, of Verona, commenced to search Il Bor on his own account, and succeeded in a couple of seasons in securing from it a small collection of antiquities, including objects of stone and bronze.

On the western and more sheltered shores of Lake Garda Professor Stoppani, of Milan, found traces of several stations; particularly in the Gulf San Felice di Scovolo, three of which were situated close to its northern shore, and two close to the Isola Lecchi on the landward side of the island. As few relics were found—only a few flint objects—and as the piles in all these stations were near the shore and in comparatively shallow water, Stoppani concluded they belonged to the Stone Age. These explorations were a sequence to the first researches in Lake Varese, so auspiciously initiated by Desor and Mortillet, and which Stoppani followed up by making an exploratory tour of the lakes of North Italy. The observations of Stoppani, however, have not been confirmed by any subsequent researches, though this particular locality is pre-eminently the most fitted for lake-dwellings in the whole of this extensive sheet of water. (B. 87.)

In 1879, under the skilful management of Cav. Stefano de Stefani (R. Ispettore degli Scavi, Verona), dredging operations were resumed at the old place in the harbour of Peschiera, which considerably added to the number of relics from this station.

In the spring of the following year De Stefani transferred his operations to an entirely new locality in the river Mincio, below the railway bridge, where the stream divides into a number of separate channels. Among the islands thus formed he had reason to suspect the existence of pile-dwellings, and in this expectation he was not disappointed, as he succeeded in finding not only the submerged piles and transverse beams, but also a large number of flint, and some bronze objects, and even a few Roman remains.

As both these investigations were undertaken by orders from the Minister of Public Instruction and at the expense of Government the relics were sent to enrich the prehistoric department of the Kircherian Museum at Rome.

The people of Verona were greatly chagrined to find that these successive discoveries, which had now attained much celebrity in archæological circles, were constantly slipping out of their hands, and that in their own local museum there was scarcely a single article illustrative of the culture and social condition of these early lake-dwellers. To rectify this state of matters and make some amends for their past neglect the Academical Commission was induced to order a fresh investigation under De Stefani, whose recent success was characterised as "risultati splendidissimi." Again the excavations of De Stefani were crowned with great success. In 1881 his attentions were directed to Peschiera, which yielded him a considerable number of articles, being the fourth important supply since its discovery in 1851. In 1883 the station in the Mincio was subjected to further explorations, and De Stefani's labours were rewarded by a rich harvest of relics, mostly of the Stone Age, which included many flint implements, as knives, hatchets, saws, arrow-points, etc.

The relics collected on both these occasions are now deposited in the Museo Civico at Verona, and at last this town shares with Rome, Vienna, and Zürich, the honour of possessing a collection of these remarkable remains. (B. 342, 358, 370, 424, and "Notizie degli Scavi, 1880 and 1884.")

From these general remarks it will be seen that there are only three lake-dwellings in Lake Garda that have yielded remains sufficiently comprehensive in quantity and variety to enable us to form some idea of the period to which they belonged, viz. the station close to the fortress of Peschiera, that in the Mincio, and that known as Il Bor on the south-east shore of the lake.

PESCHIERA.—Since the report of Baron v. Sacken the various researches conducted here have not thrown additional light on the general condition and distribution of the piles. De Stefani bears testimony to the accuracy of the facts as to the archæological stratum in which the relics were found, and observes that the overlying bed of sand and gravel sometimes attained a depth of over 4 feet. (B. 424, p. 9.) In it were found decomposed organic matter, bits of charcoal, fragments of pottery, and bronze objects. In the previous discoveries only one stone implement was recorded, so that the station was considered to be exclusively of the Bronze Age. Nor was its character in this respect much altered by the recent researches, as only a few implements of stone were found, viz. two knives or scrapers, one arrow-point and a few chips of flint, a round sling-stone of granite, and another of an oval form with marks of having been used. Nothing of importance was added as regards its *flora* and *fauna*. De Stefani describes a curious object like a biscuit, picked out of the dredged stuff, which he considered might have been a cake of bread. It was made of viscous matter and measured 4 inches in diameter and ¾ of an inch thick, and contained bruised cereals; but, as he was examining it, it slipped through his fingers and again fell into the water. (B. 424, p. 10.)

This settlement appears to have flourished exclusively in the Bronze Age, as may be seen from a glance at the accompanying illustrations (**Figs. 63, 64,** and **65**).

Pottery.—The fragments of earthenware indicate a great variety of vessels made of two kinds of paste—a coarse and a fine quality. Of the latter, Nos. 26 to 30, **Fig. 65,** are sufficient to show that the ceramic art of the lake-dwellers was identical at one period of their existence with that of the terramaricoli in which the *anse lunate* (No. 26) are so characteristic.

Bronze.—Weapons, implements, and ornaments of this material are extremely numerous, numbering upwards of 300 objects. Among the weapons we find socketed lance-heads (**Fig. 64,** No. 10), daggers (No. 1 to 7), single-edged knives (No. 11), and a remarkable series of double-edged dagger-knives with riveted tangs or sword-like handles (**Fig. 65,** Nos. 10, and 12 to 14).

The implements include three kinds of hatchets (**Fig. 63,** No. 30; **Fig. 64,** No. 32, and **Fig. 65,** No. 11), chisels and gouges (**Fig. 63,** No. 36), sickles (No. 33), various forms of razors with handle and double cutting edges (Nos. 1 to 5), needles (No. 7), and fish-prongs and hooks (**Fig. 64,** Nos. 18 to 21, 30 and 31).

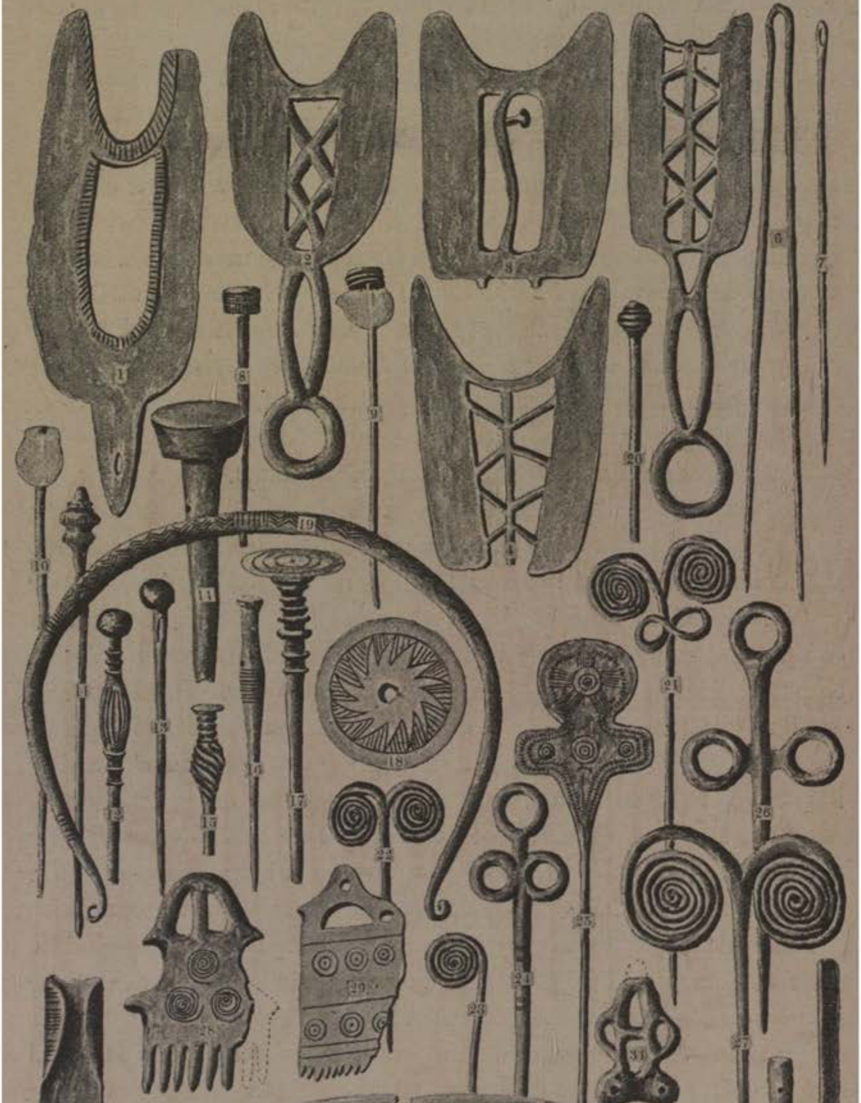
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Fig. 63.—Peschiera. All ½ real size.

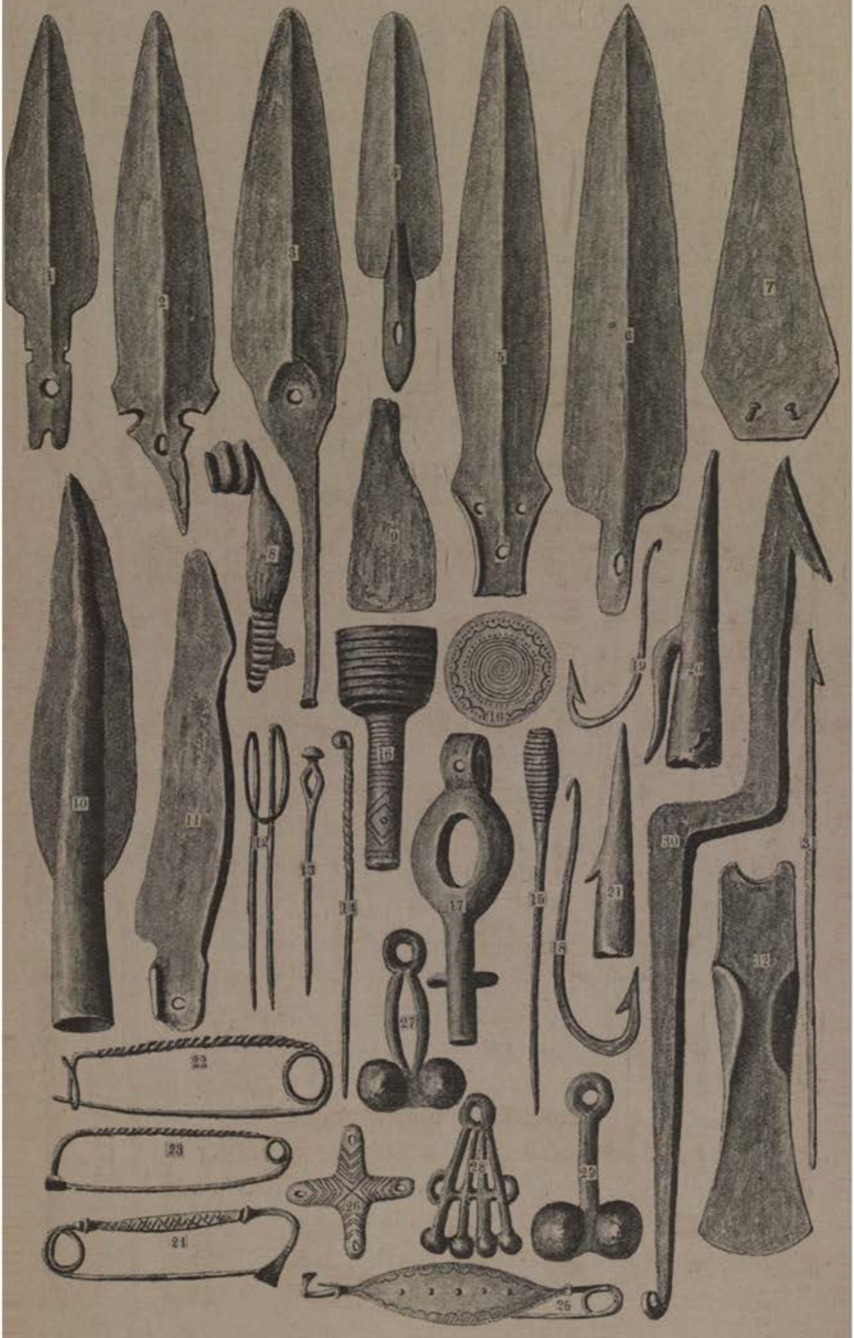
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Fig. 64.—Peschiera. No. 32 = $\frac{1}{4}$, and all the rest = $\frac{1}{2}$ real size.

The ornamental objects are hair-pins, combs, pendants, bracelets, fibulæ, and a torque. Hair-pins are in great numbers and of extreme elegance both in form and ornamentation (profusely illustrated in **Figs. 63, 64,** and **65**); among them are some with amber heads (**Fig. 63,** Nos. 9 and 10); some have flat, others disc-shaped, heads (Nos. 17, 18, and 25); especially interesting are those with heads made of various combinations of spirals (Nos. 21 to 27), as being identical with the hair-pins of the terremare. Combs are of bone (No. 29) as well as of bronze (No. 28). Pendants of curious and varied forms are also abundant (**Fig. 64,** Nos. 27 to 29), among which one (**Fig. 63,** No. 34) is of lead. The small ornamental cross represented by No. 26, **Fig. 64,** is of tin. The fibulæ are also of diversified forms, as may be seen from the illustrations (**Fig. 64,** Nos. 8, and 22 to 25). The bracelets are of two kinds, made of thin bands (**Fig. 63,** Nos. 31 and 32), one closed with a hook and the other open. Only one torque (No. 19) has been found at Peschiera, and in form it is similar to the few recorded from the Swiss lake-dwellings (**Fig. 10,** No. 3).

Finally there are a few spirals, bits of wire, and one special object of unknown use (**Fig. 64,** No. 17).

The relationship which these objects have to analogous remains in foreign countries is most exhaustively and ably dealt with by Professor Pigorini. (B. 310.)

MINCIO.—As the surplus water of Lake Garda, under the name Mincio, passes beyond the railway-bridge, it divides into two larger channels and some smaller ones, forming a series of acutely-pointed islands. The bed is here irregular, and at various points the tops of piles were seen in groups projecting from the bed of the river. The first explorations were in the larger channel to the left. Here De Stefani found several objects of antiquity, among which the following are the principal (B. 358):—

Bronze.—The corroded blade of a knife-dagger (double-edged), portion of a dagger-blade with a mid-rib, portion of another with deep longitudinal grooves, portion of a small disc and portion of a spiral.

Flint.—Two rectangularly-shaped hatchets, a saw (curved), a javelin, an arrow-point, a lance-head, small knives, and a large quantity of chips, cores, and crude flints.

Pottery.—Two spindle-whorls, a quantity of handles and fragments of dishes.

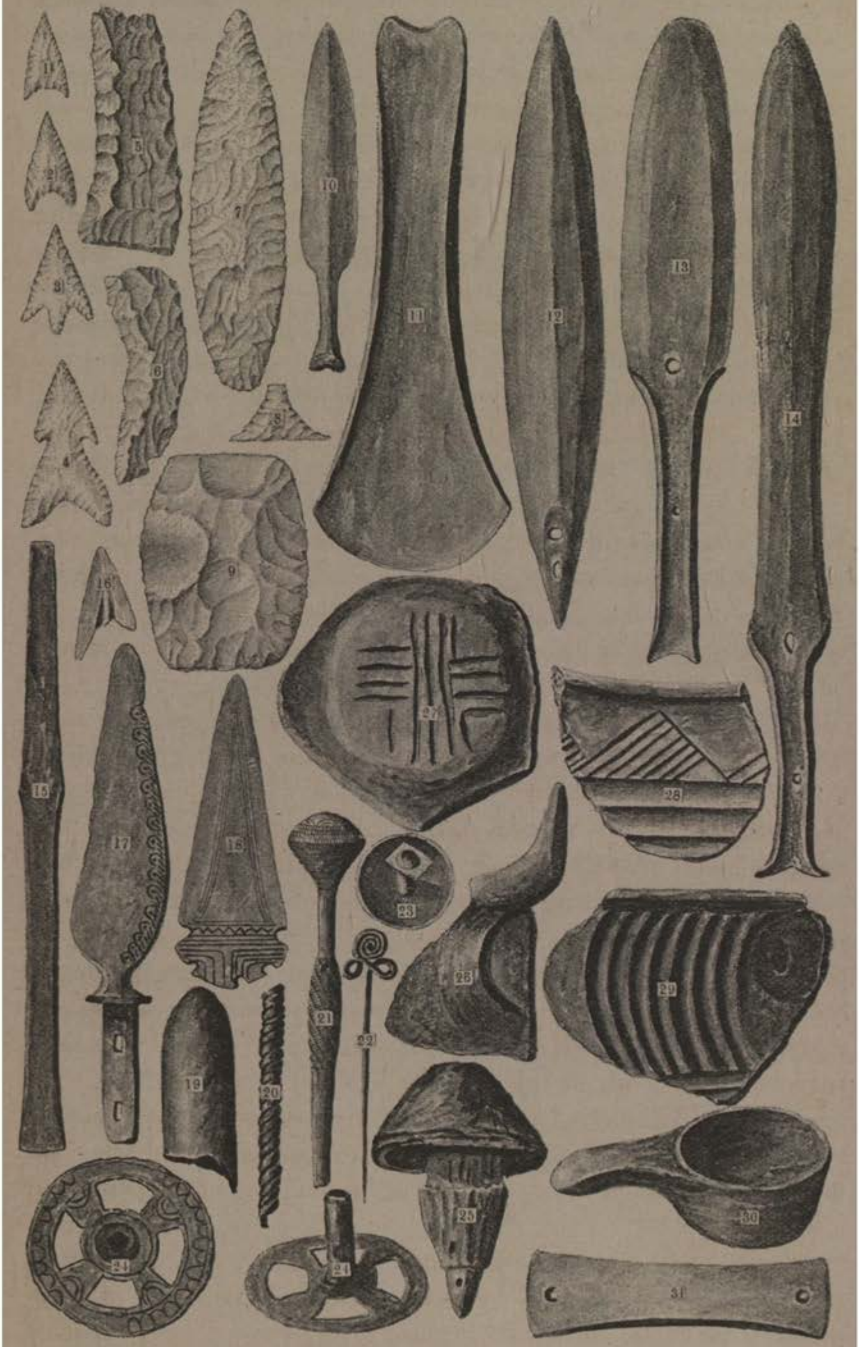
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Fig. 65.—PESCHIERA (10 to 14, 21, 26 to 29, and 31), IL MINCIO (1 to 9, 17 to 19, 22, 23, 25, and 30), and IL BOR (15, 16, 20, and 24). All ½ real size.

Staghorn.—A portion converted into the form of a hatchet, a hair-pin, and several other worked bits.

Bones, etc.—A large quantity of teeth and bones of the ordinary domestic animals.

At another spot, 200 yards lower down in the central canal, amidst a group of piles he collected:—

Bronze.—A knife (**Fig. 65,** No. 17), two small dagger-blades with rivet-holes, the point of a sickle, two bits of the cutting-ends of axes (paalstabs), two hair-pins 10 inches long and three smaller ones, a disc-shaped head of a pin, portions of a fibula, together with fragments of various other undetermined objects. One interesting relic is supposed to be the knob of a handle (No. 25).

Stone.—One portion of a polished stone of basalt (No. 19).

Flint.—The implements of this material were here in great abundance (Nos. 1 to 9). Eighteen hatchets, mostly of a rectangular form (No. 9); 60 saws (Nos. 5 and 6); 49 arrow-points (Nos. 1 to 4), of which one (No. 4) has four barbs and another is chisel-shaped (No. 8); 13 lance-heads (No. 7), etc.

Amber.—Two beads, one reddish and the other yellow.

Pottery.—Various fragments, especially handles of vessels of different forms—*cornuta, lunata, lagotis, bitubercolata,* etc. Some of the dishes were of fine black ware, among which I may note a spoon (No. 30), but generally the coarser kinds predominated. Spindle-whorls were also numerous and varied in form, not less than 31 being collected. There were also two large net weights, one round and the other ring-shaped.

Staghorn.—Several worked bits: one was a portion of an ornamented comb and another part of a handle of some sort.

Money.—Four coins, much corroded, supposed by De Stefani to be of the second half of the third century.

In 1883 De Stefani resumed his researches in the same place. (B. 424.) On this occasion the bronze objects were limited to one or two insignificant fragments; but, on the other hand, the flint implements increased—knives, saws, javelins, lance-heads and arrow-heads being in abundance. Among the other things I may mention two small stone discs perforated, probably used as spindle-whorls; a small bit of green glass, together with portions of worked and unworked horn, bone, etc.

The ornamental blade (**Fig. 65,** No. 18), a neat spiral-headed pin (No. 22), and a stud (No. 23), all of bronze, are in the collection of Dr. Rambotti, and said to be from the station in the Mincio.

Il Bor.—Previous to the investigations of Il Bor by Cavazzocca (B. 355), Dr. Alberti had estimated the number of heads of piles visible on this station at 500, but this number the former considers rather high. The station stretched parallel to the shore, from which its site is now distant about a hundred yards; but it is supposed that the present level of the water stands higher than it was in the days of the lake-dwellers. One reason for this opinion is that a triple row of piles which runs shorewards, and is considered to be the remains of a gangway, was found to terminate suddenly about half-way. The *strato archeologico* lies under a thin covering of sand and gravel, which Cavazzocca explains to be the *débris* of the disintegrated morainic coast carried outwards by the boisterous action of the waves.

The principal relics collected by Cavazzocca are as follows, most of which are illustrated in his monograph:—

Bronze.—Four knife daggers similar to those from Peschiera; three pin-heads, "*capocchie di aghi crinali*" (**Fig. 65**, No. 24), like those from the terremare; one axe-head with wings, like No. 30, **Fig. 63**; one conical button; two chisels (**Fig. 65**, No. 15); four hair-pins; two fragments of spiral tubes (No. 20), and six undetermined objects.

Pottery showed diverse forms, including *anse lunate,* and fragments of vessels, spindle-whorls, etc.

Stone.—Three fragments of stone moulds, several whetstones, and an arrow, knife, and several chips of flint.

An arrow-point of bronze (No. 16) and a couple of small daggers from Il Bor are in the Museum of Rome.

LAKE FIMON. (B. 83, 110, 132, AND 295.)

About four miles to the south of Vicenza, at the southernmost point of an irregularly-shaped valley of rich meadow-land, lies the small lake of Fimon. At the present time it is hardly a couple of miles in circumference, but before the Debba Canal, which carries its surplus water to the river Bacchiglione, was cut, it is known to have been considerably larger, and in prehistoric times it is supposed to have covered the larger part of the valley. In a meadow called Pascalone, near its north end, and close to where the Debba Canal begins, Mr. Lioy detected the tops of piles jutting out of the grass, which he at once concluded to be the remains of a lake-dwelling—a supposition which was completely verified by extensive excavations. The surface of the meadow where these piles were visible was less than 2 feet above the level of the lake, and on making excavations over a selected portion the following facts were ascertained:—

Piles.—The piles were from 8 to 12 inches in diameter, singly and irregularly placed, but sometimes in groups; some were hard and black (oak), and others soft, but they bore no traces of any cutting implements. In some instances they were surrounded with heaps of stones. They penetrated deeply, and one which was pulled up measured 18 feet in length. No traces of a gangway stretching to the shore could be discovered.

Relic-bed.—Below a thin covering of vegetable-mould there was a peaty bed about 16 inches thick, and underneath this, lake-marl containing various kinds of freshwater shells to the extent of 3 feet 4 inches. To this succeeded the *strato archeologico* with its various contents—decomposed organic matter, broken bones, fragments of pottery, flint implements and other worked stones, bits of straw, reeds, charcoal, clay plaster, burnt faggots, etc. This bed was about 12 inches thick, and its matrix was of a yellowish-black colour, which, when cut into, had a doughy consistency and emitted a strong sulphurous smell.

Relics.—The rough stone implements were made out of the limestone of the neighbouring hills, very seldom of sandstone, but more frequently of flint from the spurs of the Alps. These flints were in considerable numbers in the form of chips, nuclei, and unfinished implements, very few of which were well formed; a few rudely-formed arrow-points, lance-heads, knives, and saws or scrapers; pebbles of limestone, probably hammer-stones; stone discs, 2 to 4 inches in diameter (only one was perforated); also numerous slingstones made of sandstone, basalt, and serpentine; one fragment of granite, flattened and polished on all the four sides, but only one small polished stone celt. Many of the bones were worked, and there were tynes of staghorn, sharpened at the top and perforated at the base; also pointers, spear-heads, spatulæ, and splinters of all kinds.

The fragments of pottery were so plentiful that a handful of mud could not be taken up without finding some pieces in it. Amongst some thousands of fragments about 50 vessels in a more or less perfect condition were picked out. They are all of a dark colour, with handles attached, generally below the rim, and flat bases. Some of them have everted lips, and many are ornamented with knobs, depressions, or raised ridges (circular, wavy, or confluent). Some of the handles approach the form known as *anse lunate,* others terminate in a round button (*ansa mono-appendiculata*). One small bowl had two handles. The paste was of two qualities: one fine, and the other mixed with coarse bits of gravel, quartz, and carbonate of lime.

Numerous specimens of spindle-whorls. They are flat circular cakes of clay, like small wheels, perforated and unornamented.

Organic Remains. — Fruit of the water-chestnut (*Trapa natans*), kernels of cherries, hazel-nuts, acorns, bramble seeds, etc.

The bones of the stag and wild boar seem to predominate among those of the sheep, ox, roe, badger, etc.; also a large quantity of the broken carapaces of a small fresh-water turtle (*Emys lutaria*).

Some five or six years later (1871) Mr. Lioy made further excavations near the same place, and came upon a relic-bed 8 inches in thickness and only 16 inches below the surface, which he considered to be the remains of a pile-dwelling of a later age. In this relic-bed he found a bronze celt (**Fig. 66,** No. 1) and some flints of a grey-reddish or yellowish colour (different from the blue variety in the earlier dwelling), but no stone implements and no arrow-points. Pottery was not abundant, but it was made of a finer quality and the ornamentation shows a higher style of art. Mr. Lioy also observes that the bones of the domestic animals, such as sheep and oxen, are now in excess of those of wild animals.

As a final report of the *abitazioni lacustri* of Lake Fimon (B. 295) Mr. Lioy has published a lengthy monograph with numerous plates of illustrations. The work, however, deals more with extraneous and general considerations than specific facts or details bearing on the remains of the palafittes in this lake. I consider the station at Polada, with its remarkable relics, far more typical of the Stone Age lake-dwellings, and I have accordingly selected it as a standard for such remains in the eastern valley of the Po. Moreover, Mr. Lee (B. 119, 2nd ed.) has already presented to English readers an abridgement of Mr.

Lioy's work, with no less than nine plates of illustrations; whereas a report of the discoveries at Polada has not yet been published at all. I have, therefore, restricted my illustrations from Lake Fimon to the few objects on **Fig. 66,** which include a bronze flat celt, a large clay ring, and a few specimens of pottery.

ARQUÀ-PETRARCA.

In the neighbourhood of Padua remains of lake-dwellings presenting in many respects similar characteristics to those in Lake Fimon, have recently been discovered in the small lake of Arquà-Petrarca situated in the Euganean hills. It was discovered in the autumn of 1885 by Professor Frederico Cordenons, who, with the aid of funds from the Museums of Padua and Este, made excavations during this and the following summer, the result of which he has just published. (B. 464.) It appears that the lake, though now only covering some dozen acres, was formerly of much greater extent and occupied the whole of the present valley. In the slime of this ancient lake-basin, which is now overlaid with a deposit of peat over 3 feet in thickness, the remains of two stations were found, one on the eastern and the other on the western margin of the present lake. These remains, which consist of piles, portions of transverse beams, and a large assortment of the industrial *débris* of the inhabitants, are entirely confined to the ancient mud deposit, nothing being found in the peat above it. Mr. Cordenons does not give as minute a description of the relic-bed and its surroundings as could be desired; but as only a fourth of the area occupied by the piles has been excavated (1,000 square yards), the present report may be only a first instalment of the researches.

Among the objects collected, the following will give a general idea of its chronological position with respect to analogous remains in the Po valley:—Several perforated stone axes, half of a perforated hammer-axe of green serpentine beautifully polished, a large hammer-stone, a beautiful flint saw four inches long (" un bellissimo coltello-sega "), portion of a finely-worked laurel-leaf-shaped lance-head of flint, a number of arrow-heads, lance-heads, saws, knives, etc., of flint.

Objects of staghorn were not numerous, and only some perforated rings of this material are recorded.

The pottery is abundant, and with the description of it much

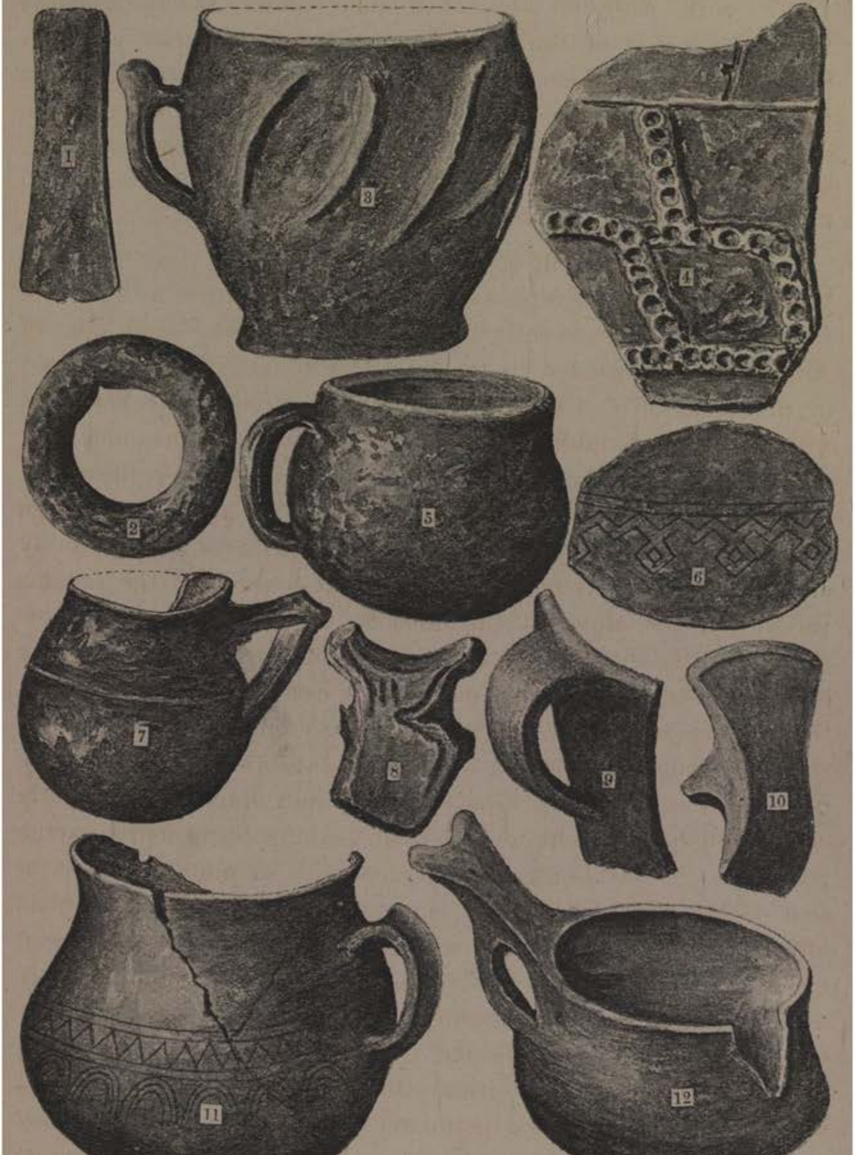

Fig. 66.—Fimon (1 to 8), and Arquà-Petrarca (9 to 12). All $\frac{1}{3}$ real size except No. 2 $= \frac{1}{6}$.

of Cordenons's monograph is taken up. The paste in the generality of the vessels is mixed with sand and bits of mica, recognised to be the *débris* of the surrounding hills. Only one dish (**Fig. 66,** No. 11) showed ornamentation of incised lines, but, on the other hand, raised lines meeting in points, forming triangles, etc., were most common. The handles were of various shapes and showed a complete series of the progressive stages, from the single button-shaped top to the almost perfect *ansa cornuta*.

No metal objects were found, and consequently Mr. Cordenons concludes that the station belonged to the pure Stone Age, a conclusion which, however, Pigorini disputes. (B. 466b.)

The pottery is very similar to that from the adjacent lake-dwellings at Fimon, and by no means dissimilar to that from Polada.

POLADA.

About half-way between Desenzano sul Lago and the village of Lonato, and a little to the south of the direct railway between Milan and Venice, there is, in the midst of a series of morainic hillocks, a small bowl-shaped hollow, scarcely 300 yards in diameter, which at one time formed a stagnant lake called Polada. It appears that at some former period, of which there is now no record, this pool had been partially drained by means of a small tunnel which was pierced through the morainic lip on its north side, and so carried off the water to a lower valley. The result of this was to expose a considerable portion of the lake-bottom, one part of which formed a tongue-like projection or promontory attached to its eastern margin. This continued to be the condition of Polada for many ages, and in course of time the remaining portion of the lake became completely filled up with peat. Some years ago the proprietors of this bog commenced to utilise its contents as fuel, and, to facilitate this operation, the margin of the crater-like cavity was pierced by a second tunnel at a lower level than the former, so as to get rid of the water. It was then found that the promontory of land, which since its original exposure had been cultivated, had been only partially bared by the first drainage, as on its inner side there was a thin covering of peat, which a little farther on suddenly sank to a great depth. In the course of removing this covering of peat from the tip of the promontory, and just on the margin of the cultivated land, some rotten piles and other indications of a prehistoric dwelling were discovered. Dr. Giovanni Rambotti, President of the Liceo Ginnasio at Desenzano, recognised this to be the remains of a lake-dwelling erected on piles, and so greatly did he interest himself in the objects recovered and daily turning up that he arranged with the workmen to preserve all the relics for him. This discovery was made in 1872, and, as the operation of clearing out the peat progressed during the following two or three years, the settlement turned out to be very rich in industrial remains. Now that the turf is entirely removed and all the relics kept together Dr. Rambotti finds himself the possessor of one of the most valuable and instructive collections of lake-dwelling remains in Italy.

From an inspection of the original outlet Dr. Rambotti calculates that before the first tunnel was executed this tongue of land would be covered by eight to ten feet of water, and he thinks that in this depth of water the lake-dwellers must have erected their piles and platform. That portion of the site might have been exposed and destroyed when the first drainage was made, is probable; but at any rate sufficient remained to be able to form some opinion as to its size. When I visited the locality with Dr. Rambotti he gave me the following dimensions, which he derived from a careful study of the locality and disposition of the piles. Its form was that of an oblong parallelogram, 65 yards long and about one-third of this distance in breadth. Its longest diameter ran nearly east and west, and the dwelling thus presented its short side to the nearest shore. Two rows of piles, about two feet apart, stretched to the shore, a distance of about 100 yards, and Dr. Rambotti justly concluded this to be the remains of a gangway. A shallow canoe, 25 feet long and 30 inches wide, having traces of fixtures for oars at three equidistant spots on each side, was found near the site of the lake-dwelling. Portions of a second canoe, apparently of smaller dimensions, were disinterred at the land end of the gangway.

But the valuable feature of this lake-dwelling is the large and unique assortment of industrial remains which it has furnished, all of which are kept together at the private residence of Dr. Rambotti, where they constitute a respectable museum.

Pottery.—The larger vessels were made of coarse greyish clay, mixed with rough sand or pebbles; but the smaller and more ornamental were composed of a fine black homogeneous paste. Besides a large quantity of fragments, there are in Rambotti's collection about 150 vessels, more or less entire, showing a considerable variety of size and form, according to the uses for which the vessels were intended. Some were large wide-mouthed jars, with two, or sometimes four, handles. The largest of this class measured 15 inches across the mouth and 9 inches in depth. One flat dish was 12 inches in diameter and only 4 deep, while another was flower-pot-shaped and measured 10 inches across at the top, 5½ at the base, and 12 in depth. Another dish (**Fig. 68,** No. 37) was perforated all over with small round holes, arranged in upright and equidistant rows, of which there were in all thirty, each row having eight holes. The measurements of this curious percolator are 10½ inches across the mouth, 8 at the base, and 4½ in depth. Some vessels, especially the larger vases, were ornamented with a line of perforations or projecting knobs round the rim; others again had a ridge marked here and there with a knob round its bulging part (**Fig. 67,** No. 6). Few were without handles. In one or two instances there was a hollow protuberance, instead of a handle, sufficiently prominent to be grasped, and the hollow part communicated with the interior of the vessel. The handles were attached generally at the rim, but often below it, and sometimes half-way down the side of the vessel. The largest handle I noticed measured 6 inches from its two points of attachment. Some of the handles were surmounted by a button-shaped prominence (No. 10); others terminated in a bifurcation like a couple of horns, which strongly suggests a rudimentary form of the *ansa lunata,* so characteristic of the terremare (Nos. 13 and 14). Of the finer kind of pottery there are a great variety of dishes, which may be classed as cups, bowls, plates, jugs, etc., some of which were ornamented with simple designs made with dots and lines (Nos. 9, 10, and 11). One handle had the form of a cross punctured on it, having one arm prolonged into a long stem running downwards, just like a modern Christian cross.

About 140 spindle-whorls of terra-cotta, some of which are variously ornamented (**Fig. 68,** Nos. 28, 29, and 36). A considerable number of perforated clay weights, of which five are flat, with the hole in the centre (**Fig. 67,** Nos. 19 and 20). The most novel objects were a few oblong cakes of terra-cotta ornamented with repeating lines of small circular depressions (**Fig. 68,** Nos. 22 to 24).

Stone Objects.—A large sandstone polisher, together with a number of smaller ones. About 40 hammer-stones of quartz, serpentine, etc., some having finger-depressions. A few perforated

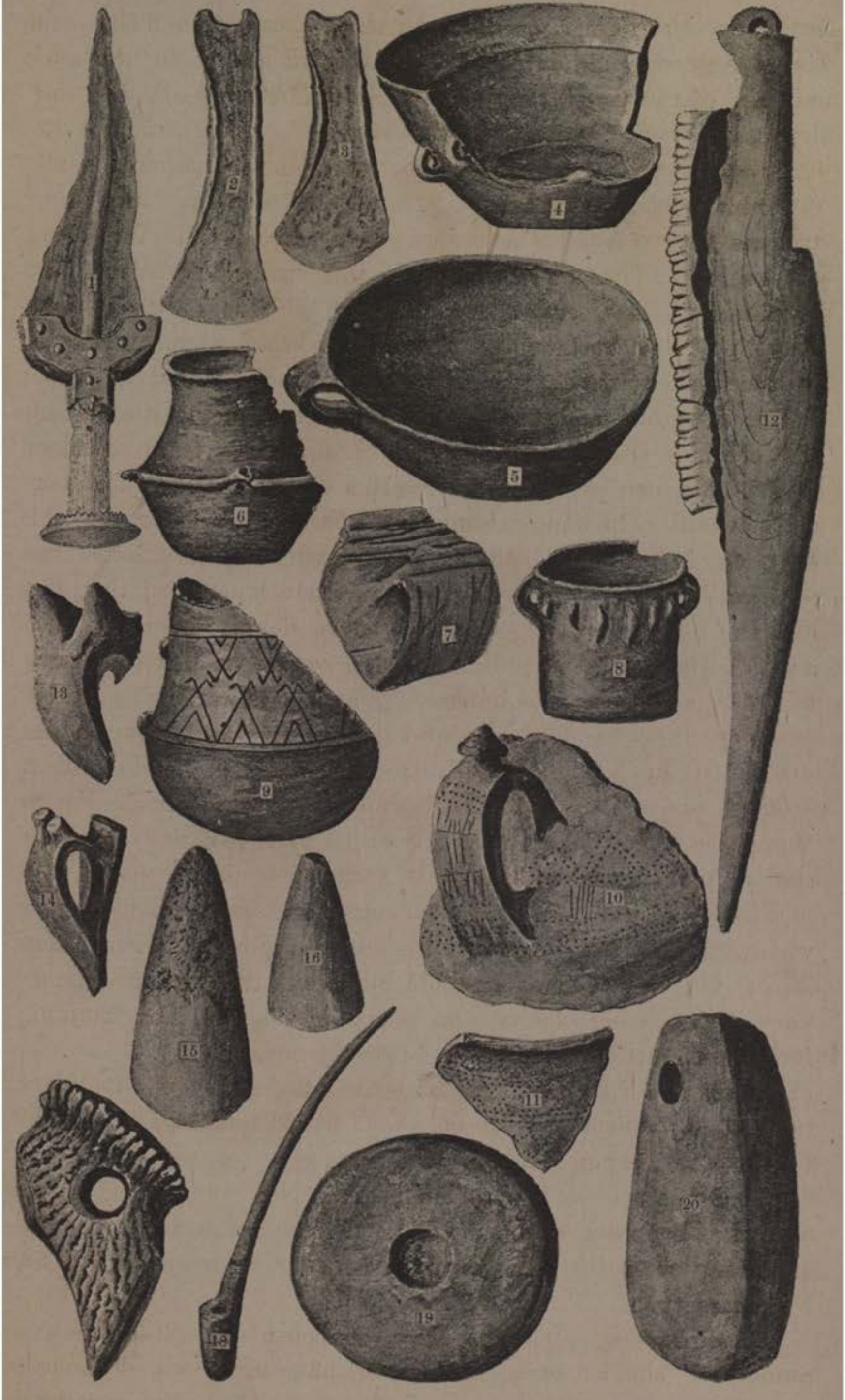
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Fig. 67.—POLADA. All $\frac{1}{3}$ real size.

stones, used as sinkers or hammers. Six round stones about the size of an egg, found in the canoe. Of polished celts there were only six of the usual type (**Fig. 67,** Nos. 15 and 16). One of the most remarkable features of the collection is the number of arrow-points, which exceed 300, presenting in this respect a remarkable contrast to Lagozza. As will be seen from the illustrations (**Fig. 68,** Nos. 1 to 19) these arrow and lance-heads are varied in form and exceedingly well made. Eight are of a rhomboidal shape, and a similar number have only one barb (No. 7). Three rectangular plates of polished stone, perforated at the corners, were probably used to protect the wrist of the archer (Nos. 34 and 35). Flint saws to the extent of nearly 100, of which a few are unique. One has slanting teeth as shown in No. 20, which represents both sides of the flint. A few were still in their handles when found. One is very remarkable (**Fig. 67,** No. 12) as being formed of four separate flints fixed in a wooden casing by means of a groove and asphalt. This casing or handle has a grasping portion at each end—in short, it is a double-handed saw. The illustration represents this implement lying flat, and the horn-like ending projects upwards at an angle of about 40°, so that when placed in working position with the flints downwards, the horn-like projection would be directed to the left. Hence Dr. Rambotti thought the lake-dwellers were left-handed men. There were two other wooden casings, precisely similar, but minus the flints.

Horn and Bone.—About 40 daggers and pointers of bone, of which 12 are made from split leg-bones and beautifully polished like those from Laibach and other places. A number of small pointed objects of bone, chisels, pins, etc (**Fig. 68,** Nos. 25 to 27). Seven perforated axe hammer-heads of staghorn (**Fig. 67,** No. 17), also similar to those from Laibach.

Bronze.—A bronze dagger (No. 1) with a neatly-worked bone handle terminating in a button-shaped capsule. The blade was attached to a semilunar capsule of thin bronze by rivets. Portions of worked bone similar to the handle of this weapon were supposed to belong to other analogous weapons. Three flat celts of the terramara type (Nos. 2 and 3).

Ornaments.—Eight bone rings, one of which is ornamented with small circles (**Fig. 68,** No. 33). Three perforated buttons or spindle-whorls of marble (No. 30). Several other forms of buttons in stone or marble (Nos. 21 and 32). Several perforated teeth of dog, wolf, bear (No. 31), and wild boar; also one perforated shell.

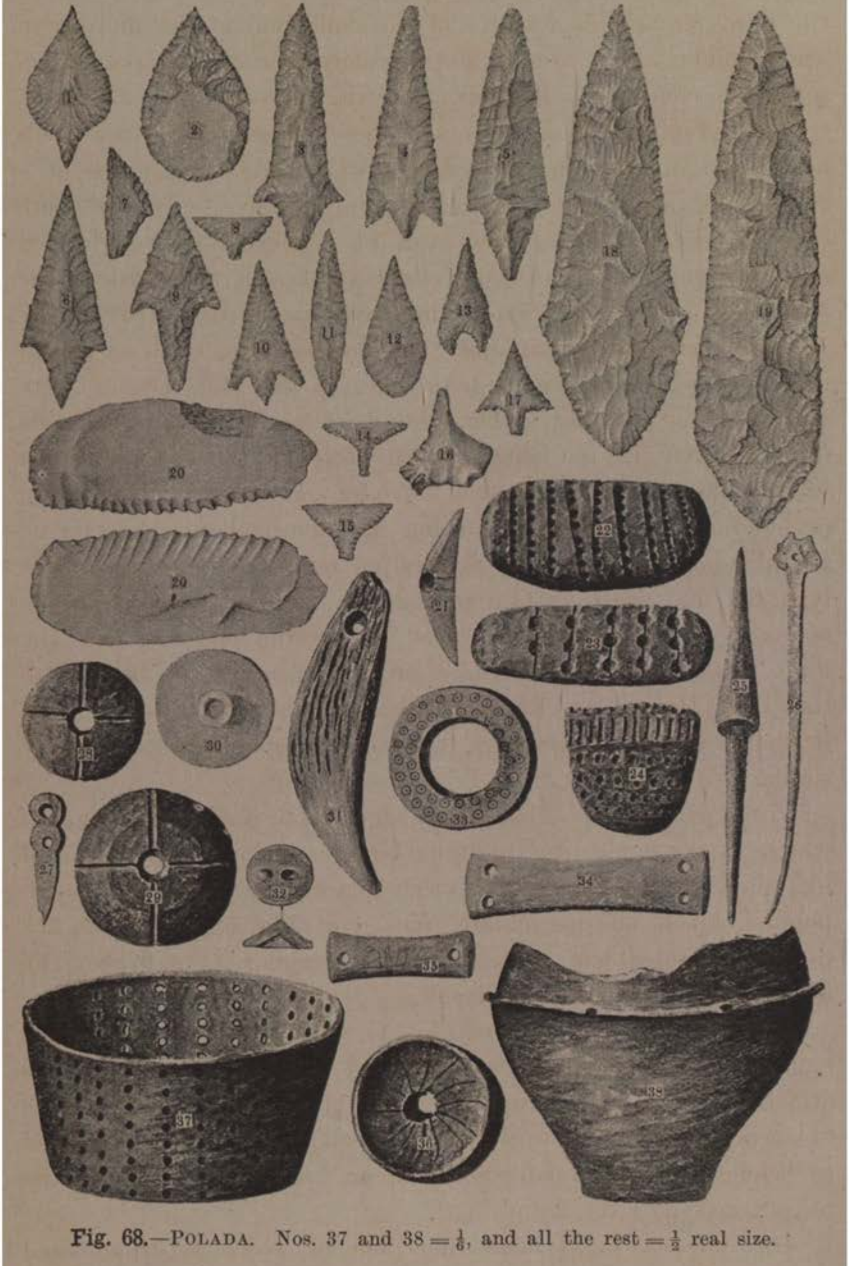
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Fig. 68.—Polada. Nos. 37 and 38 = $\frac{1}{6}$, and all the rest = $\frac{1}{2}$ real size.

Wood.—Several articles of wood are preserved, as handles of implements, a portion of an oar, fragments of the casings for flint saws. A stool with six legs cut out of the solid. These are now mostly shrivelled up and scarcely recognisable.

Osseous Remains.—Upper part of a human skull. Also numerous bones of the following animals:—the urus and some other breeds of cattle, horse, sheep, goat, dog, cat (one skull), wild boar, pig, stag, and roe.

Dr. Rambotti thinks that there was satisfactory evidence to conclude that the settlement had been destroyed by fire.

No report of this remarkable lake-dwelling has yet been published in Italy, but the principal objects were exhibited at a Congress of Art and Archæology held at Brescia in the autumn of 1875. On this occasion no less than fourteen pages of the published catalogue of the exhibition are devoted to the enumeration of Dr. Rambotti's collection from Polada.

CASCINA, Etc.

The Torbiera di Cascina, situated between Castelnuovo and San Georgio, in Salice, has from time to time yielded objects which, there can be no doubt, belonged to ancient pile-dwellers. The station was first recognised by Martinati (*Adige*, 1874, No. 23), who found flint arrow-points, a laurel-leaf-shaped lance-head, some stone implements, bits of staghorn, etc. In 1878 Pigorini gives a further account (B. 328d') of some of the objects since discovered, including 18 flint pieces—arrow-points of various forms, including one of the so-called rhomboidal type (*selce romboidale*), a magnificent lance-head, a fine saw, and one small triangular chisel. In the Museo Kircheriano at Rome there are also preserved a bronze axe of the flat type (**Fig. 51,** No. 9) and a curious knife of bronze (No. 12), similar to those from the lake-dwelling at Peschiera, which were found in this place.

Martinati (B. 279, p. 179) also describes another small torbiera in the vicinity of Lazise, in which three rows of piles were encountered, and associated with them were fragments of black pottery. It was also reported that in past years entire vessels of the same kind were found in the locality.

TERREMARE.

Shortly after the middle of last century certain artificial deposits of an earthy substance found scattered in the shape of large, flattish mounds, over the provinces of Parma, Reggio, and

Modena, became known to agriculturists as possessing great fertilising power—a property which they henceforth turned to advantage by using their contents as manure. To such an extent has this practice been carried that many of these deposits, notwithstanding their great extent, covering, in most instances, many acres, have now entirely disappeared. This substance looks like a mixture of clay, sand, ashes, etc., arranged in differently-coloured strata—yellowish-brown, green or black—and goes among the peasants under the name of *marna* or *mèrne;* but in scientific circles it is generally called terramara, more especially since the meeting of the International Congress at Bologna. In the course of these annual excavations various objects of antiquity were noticed by the workmen, such as Roman coins and tiles; implements of bone, horn, bronze, etc.; the bones of domestic and wild animals; and even human bones, were occasionally turned up. But these popular observations failed to lead to any scientific investigation, and when these mysterious mounds happened to be noticed by the early writers of this century each had a theory of his own to account for them. Thus the celebrated naturalist Venturi, in his "Storia di Scandiano," published in 1822, assigns them partly to the Boii, a Celtic race who here, according to him, cremated their dead warriors and ceremoniously threw their weapons and animals taken in war into the burning pile; and partly to the Romans, who subsequently inhabited the country, and selected these heaps for their dwellings and burial-places. Others supposed them to be the sacred or traditional cemeteries of successive races, and hence their contents are called "terrecimeteriale"; and it is a curious fact that many of these truncated mounds are to this day crowned by a modern church or convent, around which the Christians have been in the habit of burying their dead. Nor did the opinion of Gastaldi, published in 1861 (B. 43), throw much light on the matter. Seeing that the terremare were invariably situated near running streams, he considered them heaps of the remains of different ages—Roman graves, cremations, and funeral feasts, which had been washed down and re-arranged by floods. But these and similar theories, based on the supposition that they were the abodes of the dead, were not in harmony with the domestic character of the pottery and implements turned up. The starting-point of a long series of researches which have now cleared up the problem was the announcement by Professor Strobel of Parma, in 1861 (B. 44), that the remains of a palafitte, analogous to those found in lakes and marshes, were to be seen below the true terramara deposits at Castione dei Marchesi.

This celebrated and best known of all these settlements is situated about four miles north-west of Borgo San Donino, in the province of Parma. It was discovered about seventy years ago, and continued to be excavated solely for agricultural purposes till 1861, when Gastaldi's publications directed attention to the prehistoric remains of North Italy. Till then the numerous objects of human industry disinterred by the workmen excited little or no curiosity. Things, however, were very different after the northern wave of archæological inquiry, now greatly quickened by the discovery of the Swiss lake-dwellings, had reached the Parmensian antiquaries. Henceforth instructions went forth from the proprietor, Sig. Ugolotti, that these objects were to be carefully preserved, and now they constitute a special and most interesting collection in the Archæological Museum at Parma. On visiting Castione one sees a slight elevation rising about 10 feet above the plain and surmounted by a church and convent. These buildings, which are both lofty and extensive, are approached on the west side by a stone bridge, spanning a canal-like pool of stagnant water, which lies along the margin of the mound and partly surrounds it. Elsewhere the slope from this plateau to the level plain is gradual, except where the more recent excavations have been made, which present much the same appearance as a roadside sand-pit. Of the original size and form of the mound it is now difficult to form a correct estimate, owing to the amount of stuff yearly carted away, but the portion still undisturbed or covered by buildings may be estimated at two acres.

A perpendicular section, which can be readily obtained at various points, presents the following succession of layers from above downwards:—

1. Ordinary mould or disturbed soil for a depth of 6 feet, said to contain Roman and more recent remains.

2. The terramara beds proper, arranged in thin, wavy laminations of variously-coloured earths. Sometimes a thickish bed of clay or a black band of charcoal catches the eye; in

another place an overlapped bed is seen to shelve out and disappear altogether. But, notwithstanding a wavy or undulating appearance, the general horizontality of these layers is maintained. Their average total thickness amounts to 8 feet.

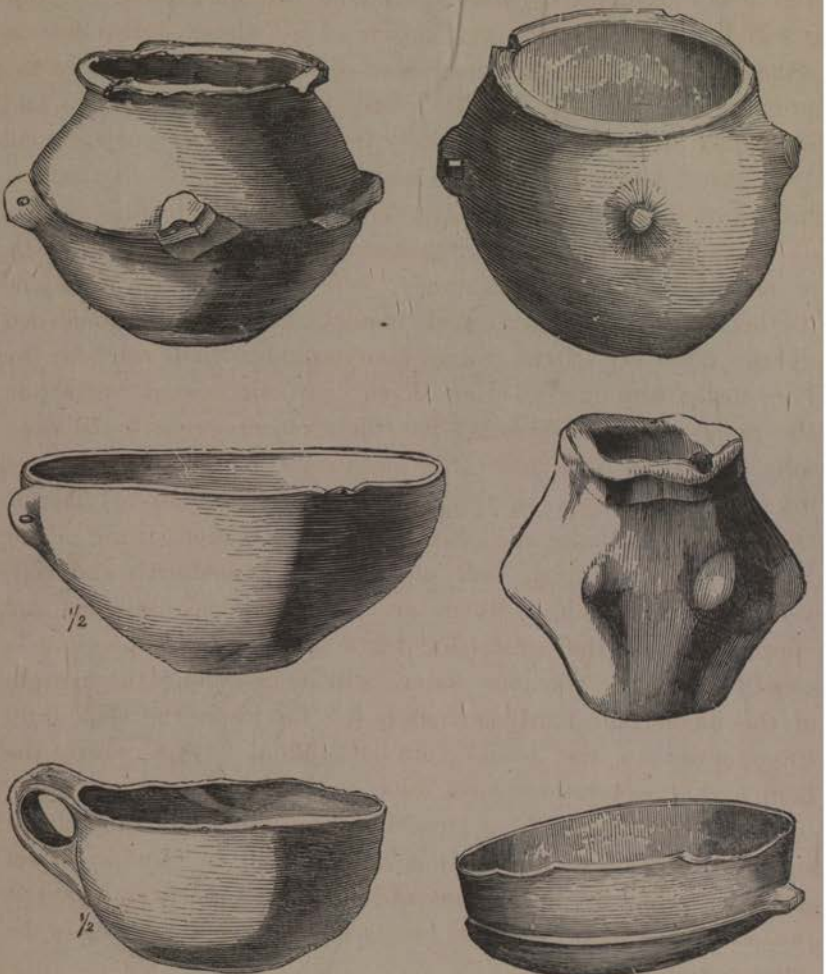

Fig. 68*a*.—Pottery from the Terremare.

3. Underneath these beds lies a blackish peaty substance, some 3 feet thick, in which, as already mentioned, Strobel detected the remains of a palafitte.

Below this peaty stratum there is a greenish clayey deposit, similar in composition to that found at some depth in the surrounding plain, into which the piles were driven.

Strobel's discovery caused much speculative interest, especially when correlated with the researches initiated by Gastaldi regarding lake- and pile-dwellings, the existence of which in Italy had just been demonstrated at Mercurago and Lake Garda.

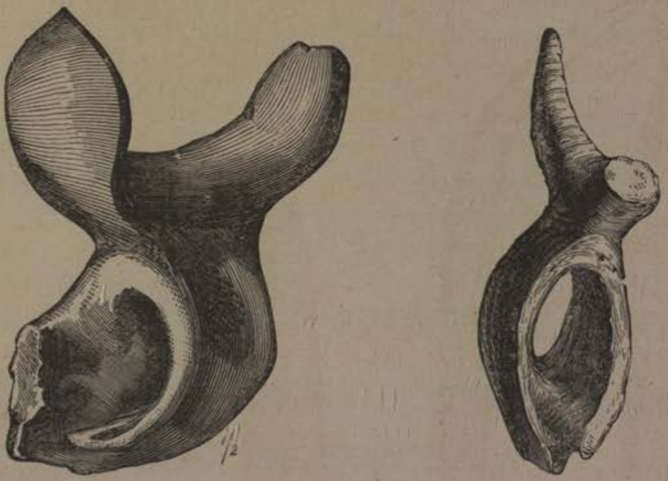

Fig. 68*b*.—Anse Lunate or Cornute from the Terremare.

Reflecting on these novel revelations and impelled, no doubt, by the growing interest in such studies, Strobel and Pigorini, both then residing at Parma, commenced a series of observations and inquiries regarding the terremare in their vicinity, the outcome of which was a joint report, first published in 1862 as part of Gastaldi's well-known article, "Nuovi cenni sugli oggetti di alta antichità trovati nelle torbiere e nelle mariniere dell' Italia." (B. 52.)

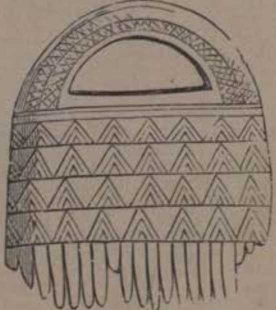

Fig. 69.—Bone Comb (½) from Vico-Fertile.

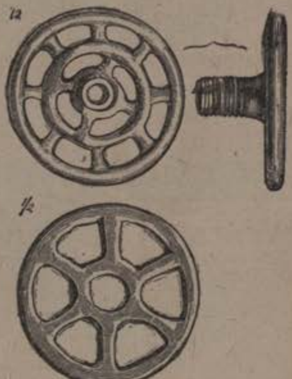

Fig. 70.—Bone Wheels from Campeggine.

In this report the authors discussed the works of man found in the marl-beds under the following five heads—viz. habitations, vessels, utensils, arms, and things of uncertain use. The pottery they recognised as having degrees of quality according to the uses to which the vessels were put. The larger vases were roughly

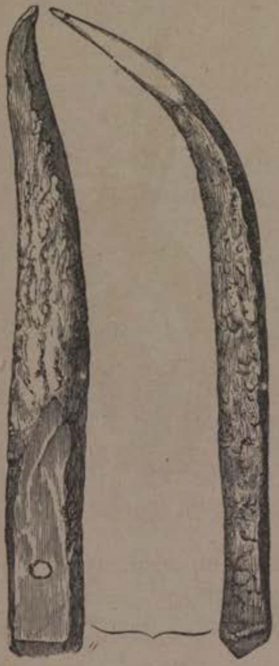

Fig. 71.—Horn implement.

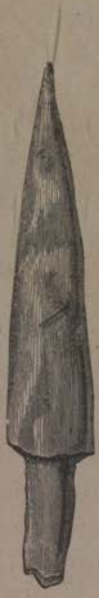

Fig. 72.—Bone ($\frac{1}{1}$).

Both from CAMPEGGINE.

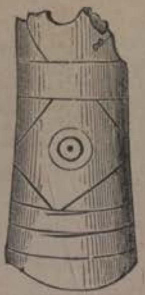

Fig. 73.—Portion of a Bone Handle from CASTIONE ($\frac{1}{2}$).

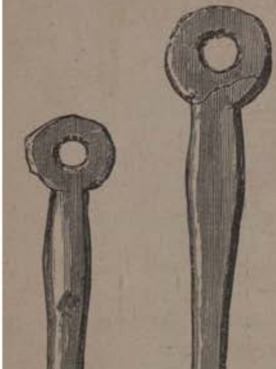

Fig. 74.—Two Bone objects from CAMPEGGINE ($\frac{1}{1}$).

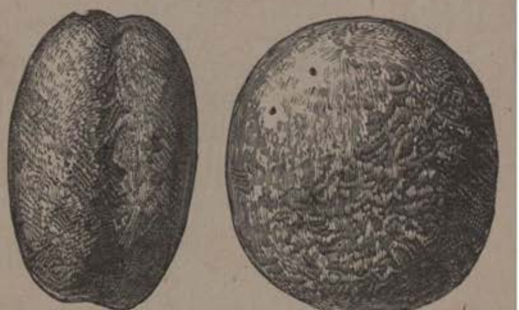

Fig. 75.—Discoidal Stone from CAMPEGGINE ($\frac{1}{2}$).

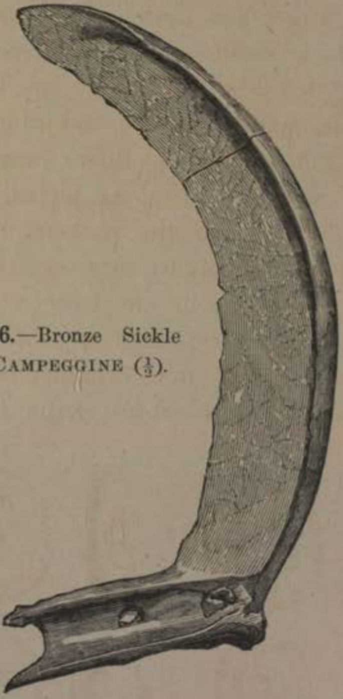

Fig. 76.—Bronze Sickle from CAMPEGGINE (½).

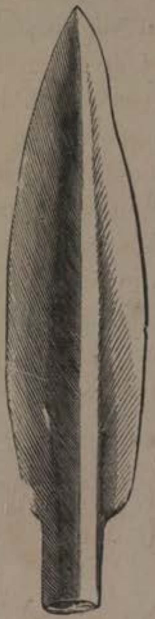

Fig. 77.—Bronze Spear-head from BARGONE DI SALSO (½).

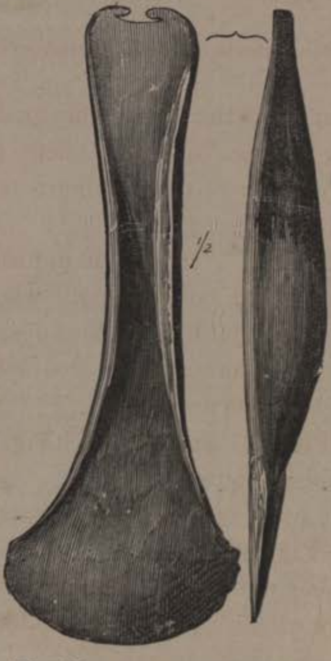

Fig. 78.—Bronze Celt from CASTELLAZZO.

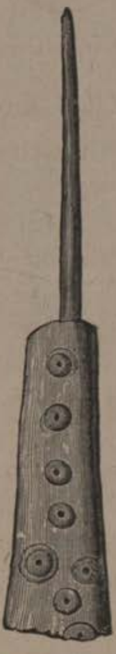

Fig. 79.—Bronze Awl with bone handle, from CAMPEGGINE (½).

kneaded, the grains of sand were larger and more visible, and the colour of the paste was ash-black inside and reddish outside. They had no glaze. The smaller dishes were made of fine homogeneous paste, with very thin walls, smooth surface, and a blackish surface approaching to varnish. According to their form they might be divided into a great many varieties, as plates, cups, basins, bottles, vases, etc. (**Fig. 68***a*). In the makers of this pottery the authors recognised an inclination to vary their handiworks, and this was especially manifested in the various forms and different embellishments of the handles, called *appendiculati*, which turned up in large quantities. These were ordinary handles with an addition on the top, either in the form of an upright button-like process or transverse bar. To the latter the greatest interest was attached, as the ends of the bars were bent in a variety of ways so as to assume the form of ears or horns as in **Fig. 68***b*.

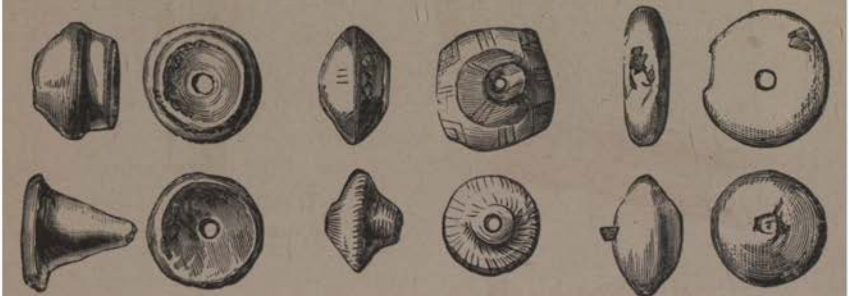

Fig. 80.—Various forms of Spindle-whorls or Beads (½) from CAMPEGGINE.

Among the utensils they distinguished a variety of industrial objects such as needles, pins, ornamented combs, small wheels, handles, etc., made of bone or horn (**Figs. 69** to **74**). Of stone there were numbers of rubbers, corn-grinders, and grooved spheroidal stones (**Fig. 75**), but very few hatchets and chisels.

Of bronze they found sickles (**Fig. 76**), spear-heads (**Fig. 77**), flat celts (**Fig. 78**), awls (**Fig. 79**), chisels, pins, etc.

Among the objects of uncertain use were classified a series of spindle-whorls of different forms (**Fig. 80**).

From the existence of metal slag and stone moulds (**Fig. 81**) the authors inferred that the terramaricoli knew the art of founding in metals.

Professor Strobel gave also a minute description of the bones and other organic remains, to which I shall afterwards refer when treating of his subsequent investigations in this wide and important field of research.

In summing up, the authors used the following words:—

"As to the first *origin* of the *marl-earths*, it is clear that the banquets, as you assert, are a considerable part; but there seems to us to appear in the scoriæ, the millstones, the heaps of grain, the palisades, the potsherds, already cited, together with the arms and utensils of all sorts which are found in these earths, something more than a mere meeting-place to banquet. It seems to us, if we do not err, that there is something of settlement and duration. Man did not meet there only to arrange and devour the feast, but to employ himself besides in domestic avocations, in preparing implements and arms, to sew garments, and make nets—in a word, to inhabit them; besides, to exercise the practices of their religious worship, and, perhaps, also to burn their dead, and all these after the fashion of barbarians, such as the people of the *marl-beds* must have been. These people, according to the place and time, were fishermen, hunters, shepherds, and even agriculturists." (B. 91, p. 83.)

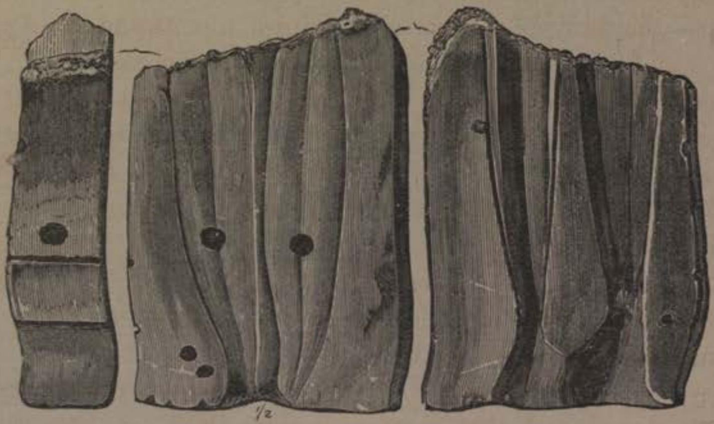

Fig. 81.—Stone Mould from CASTELNUOVO.

These words contain the most important feature of this report. The authors, though not absolutely free from the previous notions that floods and inundations had something to do with the stratification of the *débris*, distinctly recognise that the terremare must be considered as the remains of the *habitations of the living*, and not, as hitherto supposed, the resting-places of the dead.

Interest in the whole subject now rapidly increased, and extended to agriculturists and local observers. Yearly excavations were carefully scanned and even special researches were carried on in the interests of science. Strobel, a professed naturalist with remarkably precise and accurate habits, devoted his great energies to the elucidation of the organic remains, especially the rich and varied products of the peaty bed (*terra uliginosa*) at Castione, in which the piles were detected. Pigorini, on the other hand, was an archæologist pure and simple, but endowed with great ability and much fertility in the correlation and generalisation of facts—qualities which have since gained him the chair of archæology at Rome, which he now fills with so much distinction. Thus associated these two men may be said to have developed a new school of archæology, especially anent the terremare, having as its primary and indispensable object the collection of authenticated data, without which, they asserted, no deductions however brilliant could be scientific.

In the course of researches conducted by Strobel at Castione, during the years 1862 and 1863, he observed that the piles were placed in a sort of basin, either natural or artificial; that they supported transverse beams over which clay floorings had been placed; and that they were more thickly set towards the margin, and slanting, as if to strengthen the inner superstructures. Moreover, he proved that the supposed peaty formation (*terra uliginosa*) had nothing in common with true peat, but was simply a subaqueous deposit of ordinary earth, associated with decomposed organic *débris*. Another terramara in Parma having similar characteristics to that at Castione was investigated in the following year by Pigorini, and thus the theory of an occasional palafitte converted into a land-dwelling seemed to them to be confirmed. Previous to this the stratification of the beds—one of the most remarkable features of these deposits—had not excited any unusual surprise, but now it began to be commented upon.

These and some other noteworthy observations here and there coming to light induced Strobel and Pigorini to issue a second report on the terremare of Parma. (B. 89.) But in this *brochure*, which appeared in 1864, there does not appear to be any striking departure from the views expressed by the authors in their previous report. They asserted that the people who constructed and inhabited these dwellings were a nomadic or agricultural race, belonging to the Bronze Age, and were probably allied to the Swiss lake-dwellers; and that their habitations varied in structural character according to the exigencies of the site chosen. No significance was attached to the piles at Castione and elsewhere, beyond supplying a proof that different methods of construction had been in use, the adoption of which depended on local conditions. The composition of the strata as "earthy beds, now ashy, now yellowish, now reddish or black," and their peculiarly wavy arrangement, were supposed to mark merely a variety.

The terremare now became a controversial focus between the adherents of the old and new schools. To the former Cavedoni, Coppi, and subsequently Crespellani, lent their influence; while the latter were reinforced by Boni, Canestrini, Calegari, and Chierici. Amongst all these, during the next few years, Chierici stood pre-eminent. Already an ardent collector of the antiquities of his native country, he found in the mysterious terremare a congenial field and a new outlet for his love of practical research. For minute observation and lucid exposition of the phenomena observed in explorations, Chierici had few superiors. To him must undoubtedly be assigned the next great contributions towards the elucidation of the terremare problem. Observing in several instances that an earthy dyke of a rectangular shape, with a ditch outside, surrounded the terramara mound, and that upright beams, or traces of them, were to be seen in all parts of the deposits, he suggested that these were normal features in their structure. Although some of his contemporary explorers had incidentally noticed piles in a stratum different from that in which their original discovery was made at Castione, and even recorded the fact (B. 407, p. 7), it remained to Chierici alone to interpret the true significance of the discovery. In support of the theory of universality of the palafitte system, he showed that in many cases the piles had entirely disappeared by decomposition, and that the only traces of their existence were the holes they had occupied. Some of these, indeed, had subsequently become filled up by infiltrated matter, so that on section they presented the appearance of inverted cones. On this point he relates that in one space measuring 210 square metres he counted no less than 124 "buche di pali." (B. 206, p. 9.)

It must be remembered that, previous to this, archæologists had no clear notion of the order or relative position of the products of different ages and races, and the same confusion extended to the terremare. For instance, at Castelnuovo, Chierici seemed puzzled at finding, underneath a Bronze Age terramara, indications of an older period. At Campeggine, on the other hand, objects of the early Iron Age appeared, but chiefly in the upper strata, while Etruscan remains had been recognised in several instances.

Another point to which Chierici's attention was directed was the frequency with which rectangular enclosures were disposed so as to have their four sides facing the cardinal points; and this orientation within certain limits, varying, it would seem, according to the direction of the sunrise when the settlement was founded, he considered also applicable to all the terramara villages. On this point see also Helbig. (B. 308.)

In his famous theory of the structure of the terramara villages (B. 206) Chierici conceived the idea that they had been constructed over artificial basins to which a running stream was made to flow so as to convert the *bacino* into a pool of water. This pool was surrounded by an earthen dyke inside of which a wooden platform was erected on piles and covered with a layer of clay. Huts were then erected over this platform at regular intervals, and the refuse from them was thrown, by means of holes here and there, into the space below. The water entering at one side of the enclosure made its exit at the opposite side. Thus the space below the platform was more or less occupied with water, and the *débris* thrown into it became arranged into sedimentary strata, and so continued to accumulate until the entire space was filled up. When the accumulation of *débris* reached this extent it became necessary to elevate their floorings, and this was done by repeating the same process at a higher level; and in this manner Chierici accounted for the successive platforms and palafittes which were to be met with in the terramara beds.

Thus in the hands of Chierici almost every feature of the terramara deposits excited fresh interest and an eagerness for further inquiries. Piles or their traces were found almost immediately in all the stations wherever they were carefully looked for. In 1872 Chierici and Mantovani explored two stations, one at Monte Venere and the other at Monte, in which were found not only the dyke surrounding the basin and palafitte, but, in one of them, three series of piles, one superimposed above the other, thus clearly showing that when the spaces around the piles and underneath the platform had got filled up with *débris*, a second palafitte had been resorted to, which in its turn had been succeeded by a third. (B. 233 and 247.) It was on all hands acknowledged that in many parts the peculiar stratification of the layers in certain beds could only be accounted for on the supposition that water had somehow to do with the sorting of their ingredients, as floating materials, such as bits of charcoal, were often eliminated and formed separate layers. So far Chierici's theory might be taken as offering a complete explanation of the phenomena. But the deposition of the higher portions of the mound remained to be accounted for, as it was difficult to conceive of pools of water at the requisite heights. A still more formidable objection was the impossibility of transporting water without the intervention of a system of hydraulics to sites placed on elevations far above the level of any adjacent streams, and of this class several had been known, as at Monte Venere, Roteglia, Castellaccio, etc. (B. 407, p. 9); yet, in most cases, they also contained the palafitte and dyke. This was the weakest part of the theory and found few supporters, but in other respects every additional discovery only tended to confirm it. Strobel, however, declined to believe in the universality of either dykes or palafittes. Thus, writing in 1874 (B. 267), he says: "At the conclusion of an article which I wrote in 1872 on shells of *Unio* found in the marière, etc., I asserted that the terremare, those pre-historic settlements, were terrestrial; that in some of them man lived in pile-dwellings on dry ground, in others he dwelt in tents or huts; and that in some of the terramara beds earthworks can be seen, which may have been used as dykes or bulwarks, and which in all probability were fortified with ditches." After showing how impossible it would be for the terramaricoli of Roteglia and Castellaccio to have pools of water at such an elevation as they had been, he goes on to say: "And here I may be permitted to raise my voice against those who imagine that prehistoric men, and more especially those of the marière, and of our terremare and pile-dwellings of the Bronze Age, always and everywhere followed constantly one uniform and invariable order in arranging their abodes, as if they were inferior to the animals, nay, even to the invertebrates, who modify their constructions according to circumstances. But, in fact, there is much less uniformity in these terremare than is often found in the dwellings of animals; therefore I maintain logically, that even prehistoric men changed their mode of living according to place, time, and circumstances; and that the terramaricoli did not live solely in pools of water, as some assert, but had settlements both in the water and on dry land, and that the terramara beds are the results of the latter. In some of the terrestrial settlements they probably had pile-dwellings, while in others they lived in huts or tents. Some at least of the land settlements were defended by dykes and ditches." (B. 119, 2nd ed., p. 402.)

Pigorini, on the other hand, looked favourably on the major portion of Chierici's generalisations, and in the course of explorations conducted by him at Casaroldo in 1874 (B. 266 and 297) he found everything not only in harmony with his views but some additional facts that seemed to strengthen that portion of his theory in which he maintained that the palafitte was the normal method adopted in the structure of the terremare, whatever the nature of the locality might be in which they were constructed. Thus at Casaroldo, although there was both a ditch and a dyke surrounding the basin containing the palafitte, it had no peaty understratum (*terra uliginosa*), as at Castione, but a substance precisely identical with the superimposed deposits. Here also there were traces of piles on a higher level.

Almost coincident with the publication of Chierici's theory of the terremare, in 1871, was the International Congress of Anthropology and Prehistoric Archæology at Bologna, which gave an immense impetus to such studies. Indeed, the decade which followed may be characterised as the Augustan age in the department of prehistoric archæology in Italy. The remarkable discoveries in the old cemeteries of Bologna, and in Etruscan tombs elsewhere in the Circumpadana district, together with the increasing number of prehistoric stations in lakes, turbaries, caverns, etc., greatly widened the field of research and added to the difficulty of deciphering, from amidst the endless overlappings of their remains, the history of the various civilisations which formerly characterised the country. In order to facilitate these studies the *Bullettino Paletnologia Italiana* was established at the commencement of 1875, under the joint editorship of Chierici, Pigorini, and Strobel. This periodical has done much good and is still in a flourishing condition.

SPECIAL INVESTIGATIONS AT CASTIONE.

Such was the general tenor of the opinions in regard to the terremare up to 1877, when, owing to the interest then taken in these singular remains and with the view of clearing up some of the contested points, the Minister of Public Instruction ordered a fresh excavation to be made at Castione under the superintendence of Professor Pigorini. The portion selected was an oblong space at the north side of the church, beginning at the margin and stretching inwards for a considerable distance. The result of this was the disclosure of a new and remarkable feature in its structural arrangement. At the inside of the earthen dyke, and intervening between it and a forest of piles which extended towards the interior, was a series of small rectangular enclosures constructed of horizontal beams laid one above the other. These enclosures, which extended side by side like a string of log-houses, formed an abrupt facing to the dyke. The beams were roughly hewn, and partially mortised into each other at the points of crossing, from which their ends projected irregularly, some even extending from one compartment to the next. Inside these log-houses there was nothing but rubbish—clay, gravel, bits of wood, etc.—packed firmly together. But it is needless to enter upon all the details of this curious structure; suffice it to say that Pigorini came to the conclusion that their purpose was to support the inside of the earthen dyke (*contrafforte dell' argine*). The piles were in rows about two feet apart, and each pile was separated from its neighbour by an interval of one foot. When the space was cleared there was quite a forest of these piles, and it is noteworthy that they were all inclined in one direction, viz. north-east, a fact which is well shown in the first of the two photographic illustrations here given (**Fig. 82**).

From an examination of the composition of the soil outside the limits of the station Pigorini ascertained that the bluish clay bed forming the subsoil of the terramara mound corresponded to what was the surface of the surrounding plain when the terramaricoli founded their settlement, and that the thick mass of alluvial yellowish clay in which the mound is now partially buried has been subsequently deposited.

Other interesting details are given in Pigorini's exhaustive and admirable report regarding the structure of the ditch, dyke, platforms, hearths, etc., and the peculiarity and composition of the

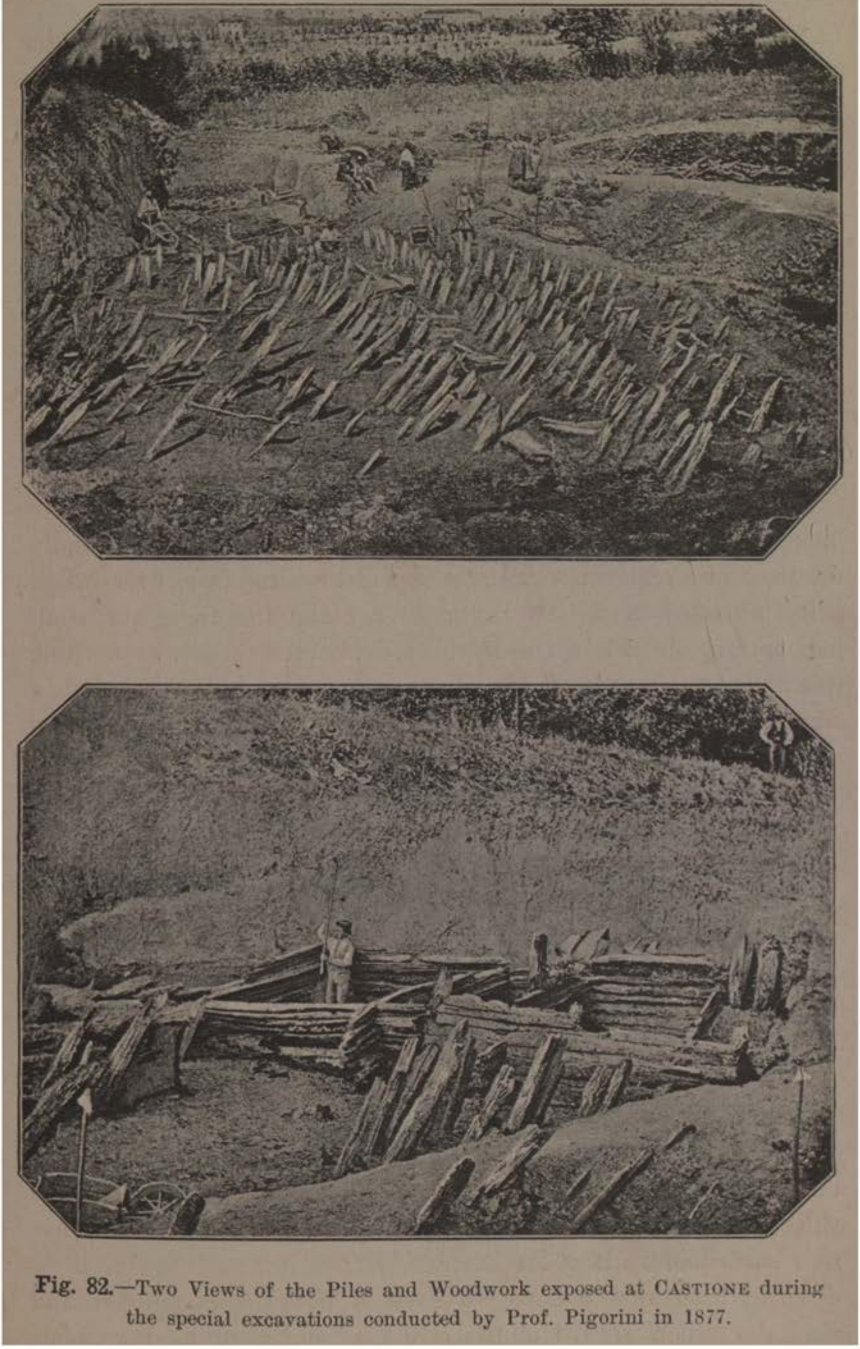

Fig. 82.—Two Views of the Piles and Woodwork exposed at CASTIONE during the special excavations conducted by Prof. Pigorini in 1877.

strata. But these the limits at my disposal in this work compel me to pass over, and I must be content with quoting the following summary of his conclusions in regard to the origin of the station:—

"The terramaricoli having arrived at the place now called Castione dei Marchesi did not select for their encampment a low-lying spot subject to inundations, but the top of a slight elevation of bluish clay not yet covered with the more recent alluvial deposits. The space measured out for the station was of a rectangular shape and covered about a couple of acres. This area they surrounded with a ditch, the excavated soil being thrown to the inside and so they formed a dyke 6 feet in height, which consequently enclosed a *bacino* having its base on the original soil of the plain. The area thus defined had an orientated position with a deviation of 30° from east to north.

"Having completed the surrounding ditch and dyke, the next step was to construct along the inner margin of the dyke a series of log-houses, bound together and filled with *débris*, over which they finally laid a gravel pavement. The main object of this elaborate structure was to support the earthen dyke. Next they planted all over the *bacino* rows of piles at regular intervals, whose tops reached to the level of the surface of the *contrafforte*, and over them they laid horizontal planks of wood which, in certain places, were covered with beds of clay (*tavole coperte d'argilla*).

"On this platform were constructed the huts of the people. The exact form of these huts has not been ascertained, but they were certainly made of wood, straw and clay, no other material having been used either at Castione or any other terramara. The village was now complete, and the inhabitants, in the course of their domestic avocations, threw the refuse of food and other *débris* into the space below, probably by means of holes, which gradually accumulated until the space became completely filled up.

"When this stage was reached the people did not change their chosen site, but proceeded to erect a new palafitte above the old one. They elevated the dyke by extending its base, placed new *contrafforte* along its inner side superimposed on the older ones, and thus continued to convert the surface of the first platform into the base of the new *bacino*. Here they repeated the operation of planting it with piles, and over these a new

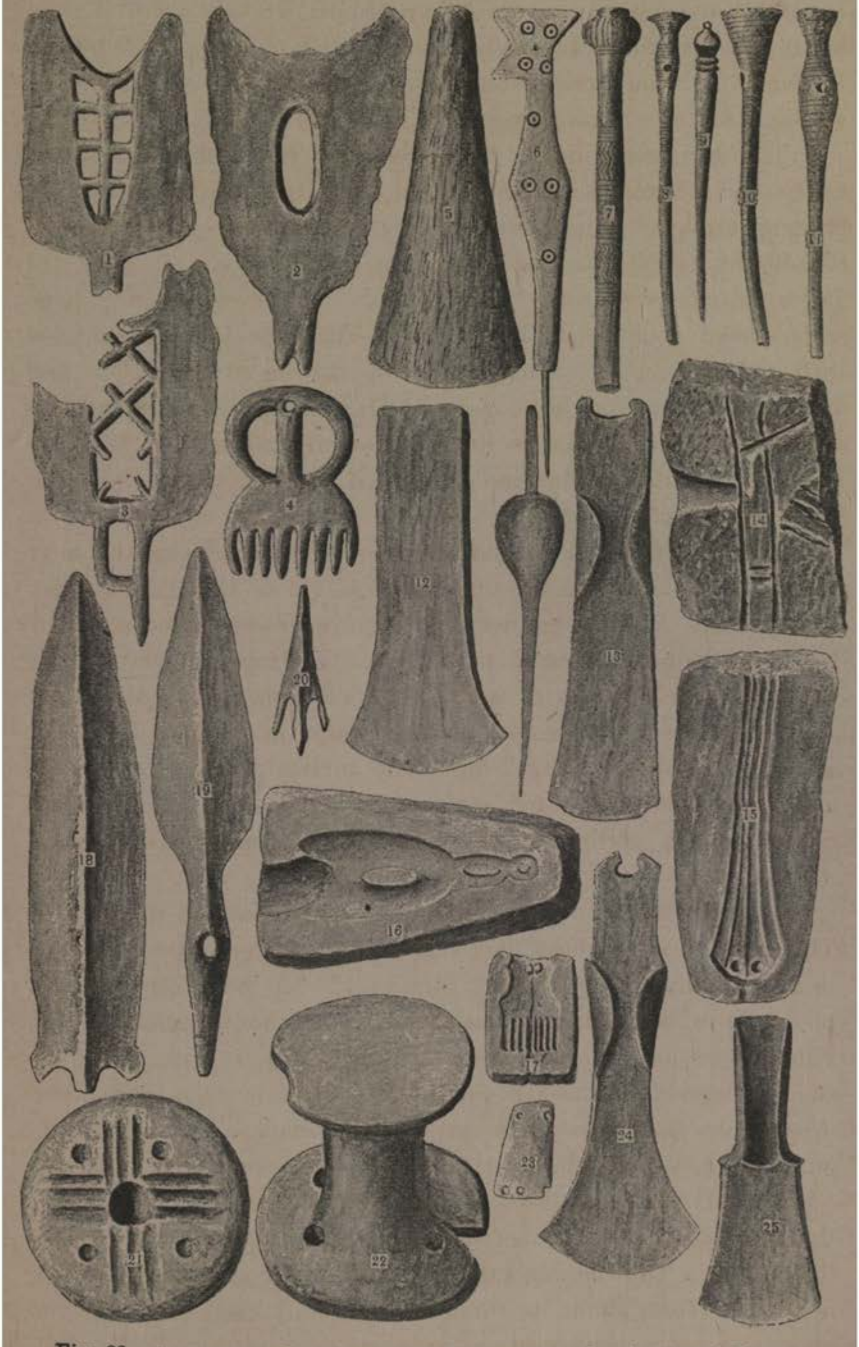
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Fig. 83.—Castione and various other Terremare in the vicinity of Parma. Nos. 1 to 12 and 18 to 20 = ½, and the rest = ¼ real size.

platform and huts were erected, which were occupied as before, until the accumulation of *débris* again drove the inhabitants to construct a third dwelling-place at a still higher level." (B. 407, p. 44.)

Illustrations of some of the industrial remains found at Castione, and other places in the neighbourhood of Parma, are given on **Fig. 83.**

MONTALE.

Another instructive station, which I visited along with the distinguished archæologist, Sig. Crespellani, is that at Montale, a few miles south of Modena. Here the elevation of the mound is more marked than at Castione, as the entire mass stands clear above the surrounding plain, and, like it, the central part is occupied by a church and some other religious buildings. The discovery of this terramara was not made till 1868, but, its contents being readily accessible, the progress of its demolition has been rapid. In 1871 it was selected as the most suitable to be visited by the members of the International Congress, and, for their special benefit, a new section was then opened up. The annual explorations conducted in this mound, of course regulated by agricultural demands, are now entirely in the hands of the authorities of the Museo Civico at Modena, who appropriate all rare objects for the enhancement of their large and valuable prehistoric collection. The director of the Museum, Sig. Boni, publishes, from time to time, a report of the excavations and of the results obtained. (B. 386 and 421.)

According to Boni, the area of the mound, including the dyke, was 9,000 square mètres (about 2 acres), of which about 4,000 are occupied by the ecclesiastical buildings already referred to. Of the remaining space available for explorations about one half has been cleared away. On the north side of the church, just on the verge of the pit where the workmen were riddling and preparing the saleable stuff, stood an enormous chestnut tree, whose roots could be seen below the grassy surface projecting from the perpendicular face of the section. The priest, whose house forms part of the ecclesiastical buildings on the mound, soon joined our party, and expatiated on the fabulous age of this tree, but which Crespellani reduced to something like 150 or 200 years. The entire height of the section here exposed would be from 15 to 20 feet, the upper five of which consisted of mouldy soil, which has, of course, to be removed before the commercially valuable stuff is reached. In the course of the removal of this upper stratum the following objects were found, viz. an iron hatchet, fragments of a spur, several keys, and some much corroded coins of the Old Empire. The remains of fifteen human burials were also encountered, three of which had the bodies enclosed in cists made of large bricks. Indeed, some large tiles, apparently part of a sepulchre, were still to be seen protruding from a part of this layer. Near one of the unenclosed burials lay a terracotta lamp and a bone comb with a double row of teeth. Sunk into the upper part of the terramara beds was a primitive lime-kiln, "evidently," says Boni, "introduced into the *cumulo marnoso* at a later period than its formation." (B. 386, p. 13.)

The great depth of this upper bed of mould, which exists in all the terremare, is very remarkable and most puzzling to archæologists. Boni thinks it was spread over the mound at some posterior time, either for agricultural purposes, or as hygienic precautions, or perhaps from motives of respect to the supposed sacred character of its contents.

All the rest of the section was terramara proper, whose contorted and wave-like beds could readily be distinguished. Sticking in the face of the section were innumerable fragments of black pottery, broken bones, and bits of charcoal. All the stuff, before being disposed of, was passed through riddles, and what remained was thrown aside as useless rubbish, the heaps of which could only be estimated by cart-loads. The riddlings consisted almost entirely of broken pottery, among which were occasional clay weights and more frequently spindle-whorls, together with the bones and horns of animals, many of which were converted into implements. Bronze objects were comparatively rare.

Part of a large earthen dyke which is supposed to have surrounded the entire mound is still left exposed on the north side. It measured from 20 to 30 feet in breadth at the base and 11½ feet in height. Boni, in his description of this dyke, states that a section which ought to be conical is not so, but more slanting on the outside; also, at the inner side, its contents are occasionally seen to overlap the terramara beds. From this and some other structural details he adduces evidence to show that the dyke had been subsequently added to by the terramaricoli during their

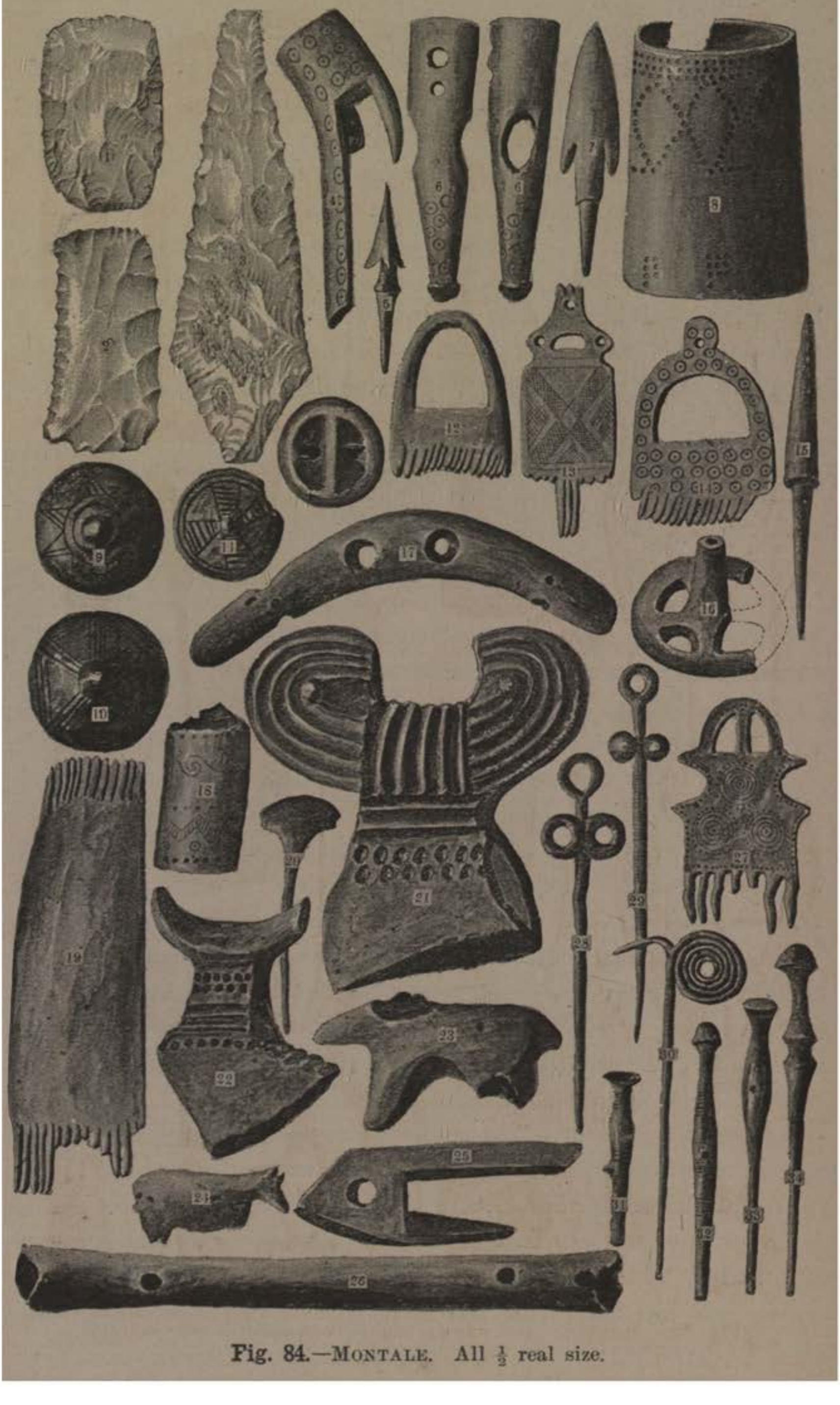
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Fig. 84.—Montale. All ½ real size.

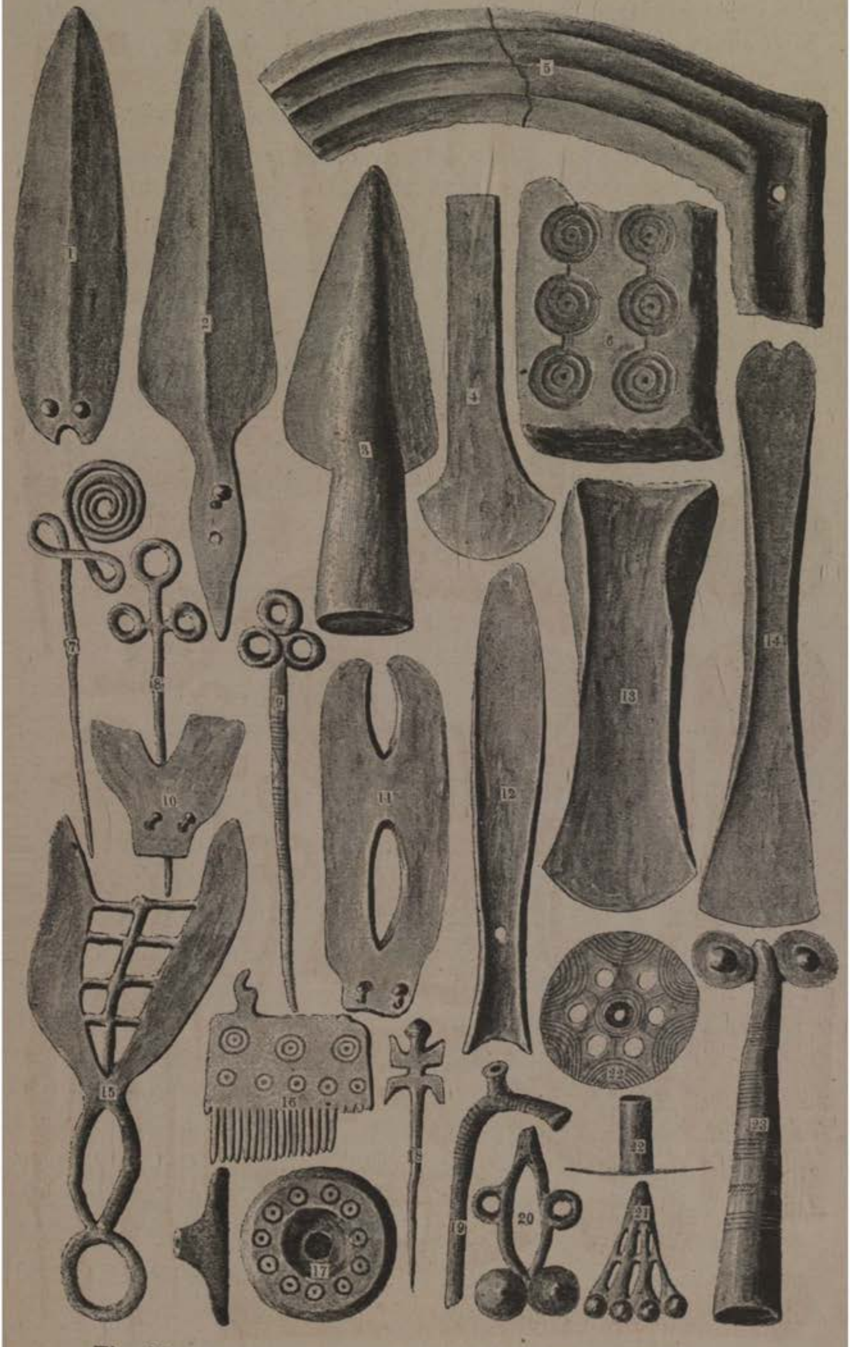
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Fig. 85.—MONTALE and various other Terremare in the vicinity. All $\frac{1}{2}$ real size.

occupation of the settlement. Bearing in mind what Pigorini says about Castione, the significance of these observations will be readily perceived.

For illustrations of relics from Montale see **Fig. 84** and **Fig. 85,** Nos. 1 to 6; and for its literature B. 157, 184, 186, 204, 231, 298b, 367, 386, 421, 422, 425a′. An account of the excursion to Montale by the members of the International Congress is given in their Proceedings for 1871 (Bologna).

CASALE ZAFFANELLA.

Another typical example of the terremare, which I wish to describe shortly, lies 1¼ mile north of the Po, near the town of Viadana. This station was accidentally discovered a few years ago by the brothers Pietro and Giacomo Tassoni, the peasant proprietors of a field in which they were making trenches for planting vines. In the course of their operations they dug up fragments of pottery, which they brought to the Arciprete Antonio Parazzi of Viadana (already widely known as a skilled archæologist and the founder of an excellent museum of the local antiquities of the district). Some of the fragments of pottery turned out to be Roman, while others were undoubtedly pre-Roman, and this led to a preliminary investigation of the locality, in which the experienced eye of Parazzi soon detected the site of a terramara dwelling. A full report of the subsequent excavations and results obtained was published by Parazzi in the *Bullettino* for 1886 (B. 451)—a monograph which is a perfect model of the descriptive details of an investigation conducted on scientific methods.

First of all let me emphasise the fact that there was here no mound at all. The field was quite flat, and to reach the surface of the terramara beds a stratum of considerable thickness, varying from 1 to 2 feet, of the ordinary alluvial deposits had to be passed through. The terramara beds then continued for a depth of 8 or 10 feet, underneath which came the subsoil on which the settlement was originally constructed. It is noteworthy that in one part of the area, underneath the terramara beds proper, a peaty bed, similar to that at Castione, was discovered. To make the resemblance still more striking, this *terra uliginosa* also contained the remains of a palafitte.

These piles were very well preserved, and some of them may now be seen in the Museum at Viadana.

It was impossible, without enormous labour, to explore this settlement to a great extent; but by a few well-directed trenches Parazzi ascertained that it was of a quadrangular shape, and orientated to within 11 degrees, and that it was surrounded by a ditch and a dyke. The enclosure, exclusive of the area of the dyke, had a superficial area of about one English acre. Its four sides measured, respectively, 208 (N.), 218 (S.), 227 (W.), and 237 (E.) feet. The dyke was 26 feet broad at its base, and 11 feet 6 inches high, and showed that it had been added to on three different occasions. Its inner edge appeared to have been very steep, a fact which suggests that, as at Castione, there had been some kind of support to prevent the earth from falling in. The ditch was 34 feet wide, and its maximum depth was 6½ feet.

The underlying peaty stratum, containing the piles, occupied much of Parazzi's attention, and he goes largely into its minutiæ. One curious fact which he records is that the dyke passed over its middle, leaving a considerable portion of the *terra torbosa* and palafitte outside the area of the terramara deposits. This undoubtedly suggests the idea that the palafitte existed prior to the terramara settlement. From the character of the relics we shall, however, see that both belonged to the same age and people.

On the surface of the terramara beds Roman remains were largely met with, and in one place they came upon a rectangular excavation, measuring 18 square mètres, containing ordinary earth, bricks, tiles, fragments of jars, and other Roman pottery. When this was cleared out there was found at the bottom, at a depth of 7 feet 6 inches, a Roman pavement, and the stratified terramara layers could be distinctly seen in the perpendicular walls. Clearly this cellar was constructed long after the deposition of the terramara beds.

Nor is the settlement of Casale Zaffanella a solitary example in the Viadana district. Already Parazzi has prepared a large map of the neighbourhood, which finds a suitable position on the wall of his museum, with no less than 12 terramara stations marked on it. Among these there is one Cogozzo (B. 372b) situated about one-and-a-quarter mile from the town and within 200 yards of the Po, which presents the same features as that at Casale Zaffanella, and also contains traces of a palafitte. Its area is an orientated quadrangle covering about an acre, but it is completely buried in mud, its highest point being 31 inches below the surface. It is surrounded by a ditch and dyke; and, moreover, the inner edge of the dyke was found to be almost perpendicular, showing that originally it must have had some kind of *contrafforte*.

Some of the objects from this group of terramara stations, now deposited in the Viadana Museum, are represented in **Fig. 86**, Nos. 1 to 13.

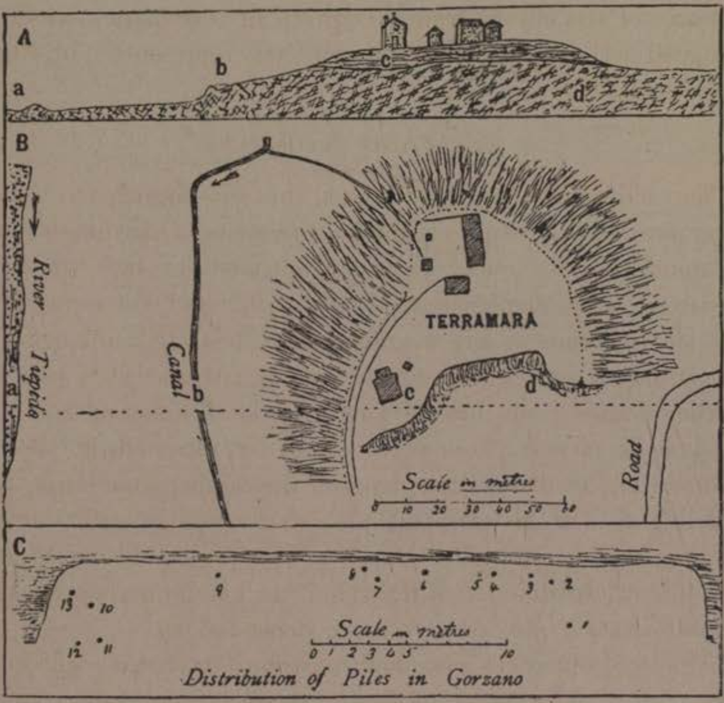
GORZANO (MODENA).

The old-school views advocated by Dr. Coppi, viz. that the terremare were remains of funeral pyres (*roghi*), so much biassed his mind that for many years he appeared to have paid little attention to the significance of the strata, and consequently the first two volumes of his magnificently illustrated monograph on the terramara settlement at Gorzano (B. 207 and 261) lose much of their value from having the objects of different ages indiscriminately mixed. This defect is so far removed in the third volume that he divides the deposits into upper and lower, corresponding to the historic and prehistoric periods. But, notwithstanding this defect in Dr. Coppi's earlier works, his investigations are of considerable scientific value, as his numerous matter-of-fact observations are strictly to be depended on.

The accompanying plan and sections of Gorzano will convey some idea of the position of the terramara beds in respect to their immediate surroundings. The deposits (marked *c* on section A) extended in length about 90 to 100 mètres from north to south, and 70 mètres in breadth, with an average thickness of 3½ mètres. The settlement was constructed on a natural elevation, rising about 9 mètres above the rest of the plain and 11 above the bed of the adjacent stream Tiepido. It was surrounded by a ditch and a dyke, and it also contained the remains of a palafitte. The existence of piles is clearly proved by Dr. Coppi himself, who gives a section (C) showing their respective positions, but at the same time he denies that they indicate the remains of a palafitte.

Of the comparative frequency of industrial remains in the terramara deposits, a correct notion will be got from a study of Dr. Coppi's report of the excavations at Gorzano during the year 1875.

In this year there were 274 cubic mètres excavated, covering an area of 180 square mètres; and from this mass of *débris* there were collected 3,051 objects, of which 173 belonged to the upper or Romano-mediæval stratum, which varied from 1 to 1½ mètres in thickness. The rest of the objects, which came from the under strata, and were reckoned prehistoric, are thus classified:—852 industrial objects, 1,544 remains of vertebrate animals, 285 remains of molluscs, 153 vegetable remains.


A
a
b
c
d
B
River Tiepido
Canal
a
b
TERRAMARA
c
d
Road
Scale in mètres
0 10 20 30 40 50 60
C
13
10
12
11
9
8
7
6
5
4
3
2
1
Scale in mètres
0 1 2 3 4 5 10

Distribution of Piles in Gorzano

The 852 industrial remains are again thus assigned:—

Bronze.—50 objects: viz. eight pins, four axes, 12 daggers, one chisel, two awls, six discs, one spindle-whorl, two fragments of sickles, and 14 diverse bits.

Bone.—80 objects: viz. 38 needles and pins (of which 23 are entire), nine spatulæ, 17 pointers, three chisels, six teeth, one lamina, five awls, and one handle.

Horn.—62 objects: viz. seven small wheels, one cylinder, one comb, two arrow-points, 17 spatulæ, 12 pointers, two awls, three ornaments, two picks, four handles, and 17 diverse pieces.

Stone.—68 objects: viz. two flint knives, two pendants, four spindle-whorls, two discs, four weights, six grinding-stones, one polisher, three flint nodules, four flint flakes, and 30 worked stones.

Terracotta.—585 objects: viz. 494 spindle-whorls (**Fig. 85,** No. 17), two cylinders, 12 weights, 68 vases, three covers, five percolators, and one small animal figure.

The bones capable of being determined represented the following animals:—15 oxen, 25 sheep or goats, seven stags, eight roes, 30 pigs, two wild boars, 14 dogs or wolves, one cat, eight birds, one tortoise, and 15 toads.

The industrial remains from the upper stratum were as follows:—The central part of a Byzantine crucifix, one lamp, two fibulæ, three rings of bronze, 12 spindle-whorls of terracotta (of which four were glazed), one spindle-whorl of amber, one spindle-whorl of glass, two spindle-whorls of talc; of iron there were 20 darts, two lance-heads, eight knives, seven keys, one lock, eight buckles, one horse-shoe, one bullock-shoe, and 11 undetermined fragments; five fragments of glass vessels; one sword-handle of wood with bronze mountings; four bronze fragments; 25 pieces of pottery (three with potter's mark); a small basin of brick; 52 coins (of which 46 were together); and some slag, etc.

The objects in the upper stratum were mostly associated with the Oratorio di S. Alberto, built about the early part of the seventeenth century, and other mediæval buildings now entirely demolished. It was found to have been built over a still older church, which dated from the third century. A few of the coins were Roman of about the same date, but the largest number dated from the end of the twelfth or commencement of the thirteenth century, and a few were of still later date. There was also a Christian cemetery found containing a number of skeletons.

In 1879 Coppi published (B. 340) an account of further discoveries, and among other objects he describes several stone moulds (10 for pins, five for lance-heads, and seven for daggers), a stone weapon of nephrite, two flint knives, a weight of white marble, etc. Of bronze there are 12 pins, three needles, 20 dagger-blades, five chisels, nine awls, and a small wheel ornamented with *graffiti*, besides a quantity of other objects of horn, bone, pottery, etc.

In 1885 the workmen came upon a grave embedded in the virgin soil underneath the terramara beds, and supposed to be anterior to their formation. It was constructed of small unhewn stones, and the space enclosed measured 5 feet 10½ inches long, 1 foot broad, and 1 foot deep. This grave contained a human skeleton which lay on the right side with the head towards the east, and along with it were found a spatula of staghorn, fragments of fossil shells, and some bits of carbonised vegetable matter. (Crespellani, "Scavi del Modenese," 1886, p. 11.)

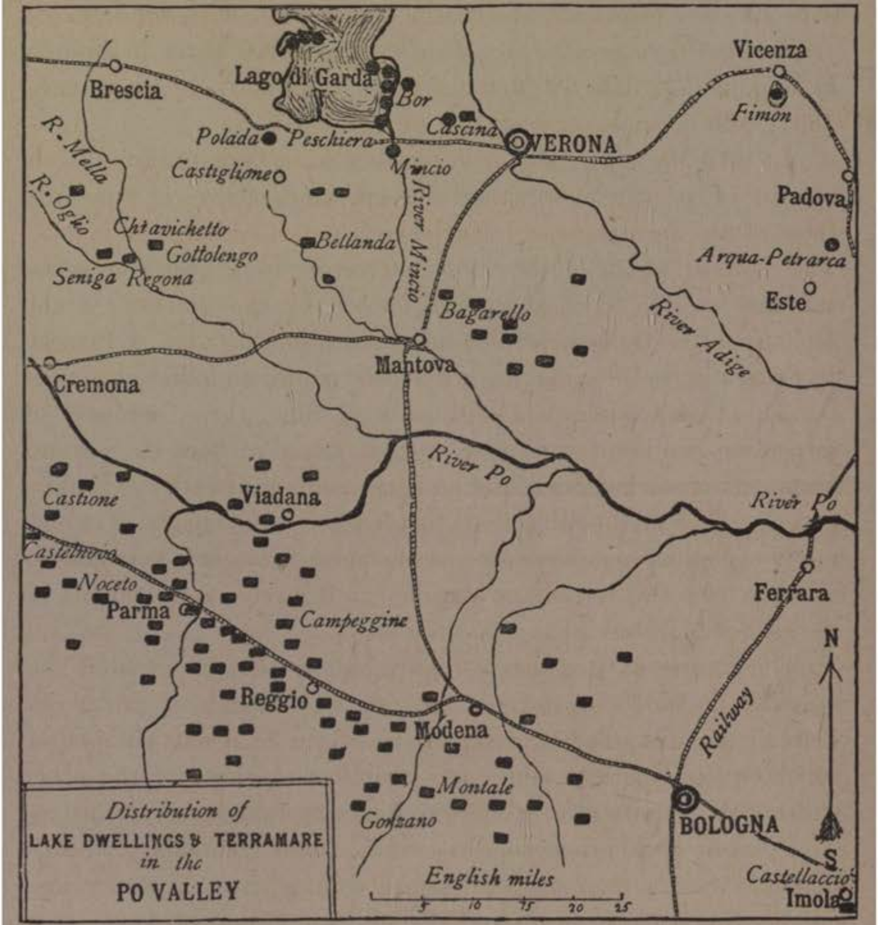
A few of the bronze objects from Gorzano are illustrated on **Fig. 85,** Nos. 9, 12 to 14, and 19 to 23.

GENERAL REMARKS ON THE TERRAMARA SETTLEMENTS.

In the above sketch of the progress of scientific research into the terremare I have selected four typical examples for special description. We have seen that in one, viz. Montale, accumulated *débris* stood as a clear mound on the surface of the surrounding plain, while that of Gorzano rested on a natural hillock. The Castione deposits also assumed the same form, but in this case the mound was only partially above the plain, the rest being buried in it. The tops of the piles found in its peaty stratum (*terra uliginosa*) were on an average 3 feet below the level of the present surface of the surrounding plain, and the lowest portion of this bed was a couple of feet still lower. In the fourth example, Casale Zaffanella, there was no mound at all visible, but on examination the remains of the settlement were found to be precisely similar to those of the others, only the mound was completely buried, as it were, in a sea of hardened mud.

The explanation of this will be readily perceived when we remember that the amount of submergence respectively shown in these instances is in the inverse ratio to their distance from the lower parts of the plain and its great water channels. The yearly inundations of the Po and its tributaries extend far and wide, each time leaving a film of mud, by the repetition of which, in the course of ages, the surface of the plain has become considerably elevated. Thus, the increase of silt since the terramara settlement of Casale Zaffanella was founded, amounts to 12½ feet—a depth sufficient to cover the highest part of the mound. It is difficult to say how much this levelling up process is accountable for the scarcity of these stations in the lower parts of the Po valley. That they existed, however, in close proximity to the river is amply proved by those stations at Viadana, as well as one or two others, for example, at Brescello, in the Parmensian district, on the south side of the river.

Distribution.—Formerly the terramara deposits were supposed to be peculiar to the middle reaches of Parma, Reggio, and Modena; but later discoveries have upset this generalisation, as they are now shown to have a much wider distribution, embracing the provinces on both sides of the Po. (See Sketch Map, page 266.)

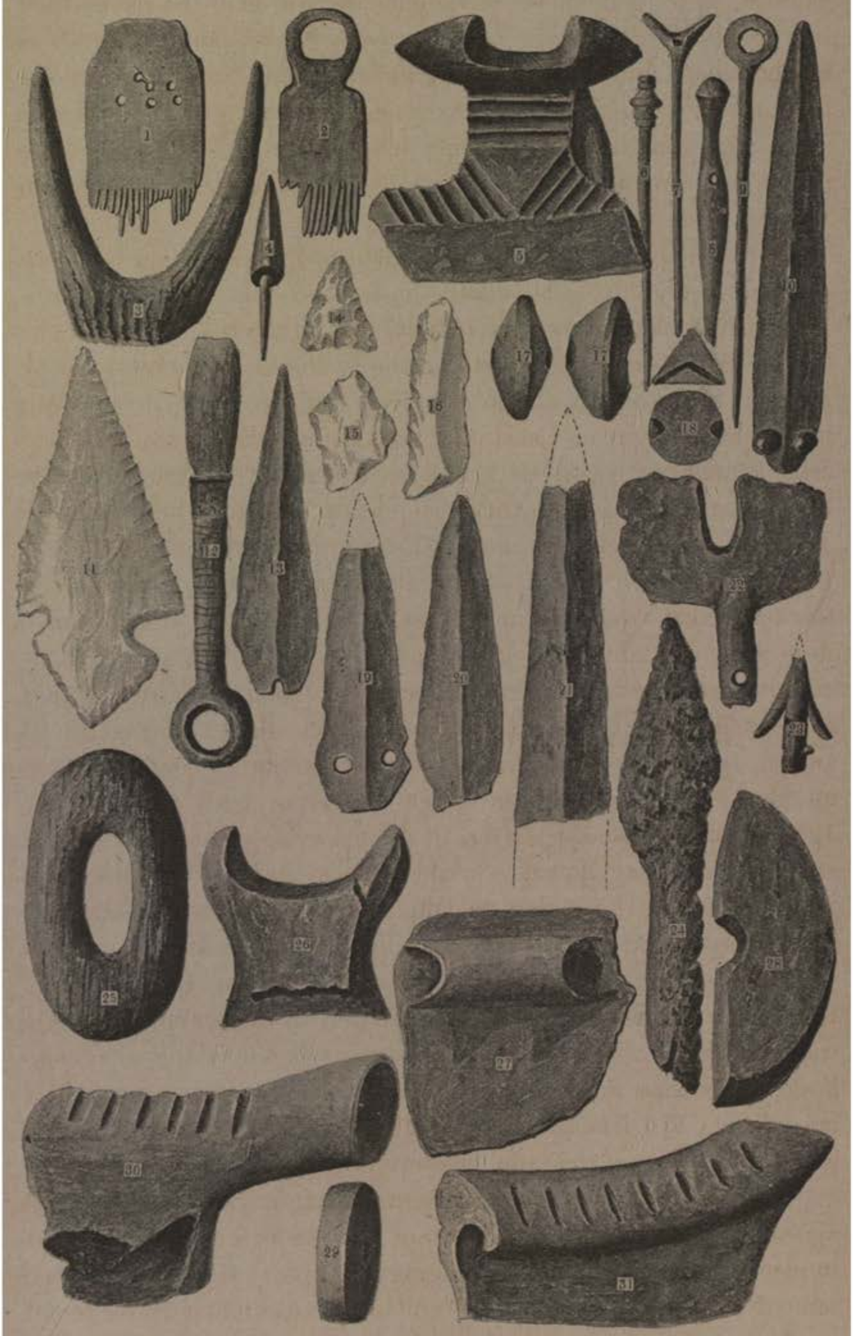

Distribution of
LAKE DWELLINGS & TERRAMARE
in the
PO VALLEY
Vicenza
Lago di Garda
Brescia
Bor
Cascina
VERONA
Fimon
Polada
Peschiera
Castiglione
Mincio
R. Mella
R. Oglio
Padova
Chiavichetto
Gottolengo
Bellanda
River Mincio
Arqua-Petrarca
Seniga
Regona
Este
Bagarello
River Adige
Mantova
Cremona
River Po
Castione
Viadana
River Po
Castelnovo
Noceto
Parma
Campeggine
Ferrara
N
Railway
Reggio
Modena
Montale
Gorzano
BOLOGNA
S
English miles
5
10
15
20
25
Castellaccio
Imola

Dr. Giacometti first (1868) directed attention to the terramara deposits in the province of Mantua, and showed their similarity to those of Emilia. A few miles north-east of the town of Mantua there was found a group of seven or eight stations, regarding one of which, Bigarello, he stated that it contained the same kind of pottery and the same forms of stone implements as that at Castelnuovo in Emilia, the only difference being in the kind of stone used, the one being taken from the *débris* of the Alps and the other from the Apennines. Among the fragments of pottery he drew particular attention to the variety of handles, which showed all the transitional forms from knobs up to the most elegant *anse lunate.* "Havvene," says he, "*di bicornute, di lunate, di bitubercolate, bilanceolate, cincinnate, transverse, appendiculate,* ecc., quasi tutta in somma, la famiglia designata dal Mortillet ('Les Terramares du Reggianais,' 1865), colla speciale caratteristica di anse lunate."

In 1874 Marinoni gave an interesting account of the prehistoric remains of the district of Seniga in the province of Brescia, especially those of the terremare at Chiavichetto and Gottolengo. (B. 265.) The former, which is the most interesting of a group of seven stations, is situated in the angle formed by the junction of the Mella with the Oglia, nearly 20 miles south of the town of Brescia. In excavating soil for making a dyke the workmen found objects of human industry—scrapers and saws of flint, three hatchets of serpentine, one large stone-adze, various stone rubbers, etc., several fragments of worked horn, and an extraordinary quantity of broken pottery. The further objects discovered here were chiefly of stone, rarely of bronze, and, according to Marinoni, they were very similar to those from the terramara stations of Bigarello and Pomella to the east of Mantua.

The station at Gottolengo, discovered in 1871, is situated five miles to the north of Regona, and on the left bank of the Mella. Before being disturbed it presented the form of a flattish mound, which on examination yielded relics similar to those of the other well-known terremare, of which the following may be mentioned:—

Upwards of 20 arrow-points—pedunculated, triangular, or heart-shaped. Some fragments of polished hatchets of serpentine; spindle-whorls of terracotta (**Fig. 86,** No. 17):—one very large, 4¾ inches in diameter (No. 28), was similar to another found at Chiavichetto. Broken bones, portions of deer-horns, some of which were made into daggers and pointers; two bone combs ornamented with triangular lines and *graffitti,* similar to those from Castione and Noceto. An oval cake or ring of wood like the supports for vases (No. 25). Of bronze there were various tools and implements. Spear-heads with a tang were most common; No. 19 represents one with two rivet-holes, a type which was also represented at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31

Fig. 86.—Viadana and stations on the north side of the Po. No. 3 = $\frac{1}{4}$, 28 = $\frac{1}{3}$, and the rest = $\frac{1}{2}$ real size.

Chiavichetto. A double-edged implement still held the rivet which had fixed it to a handle (No. 22). One arrow-point (No. 23) is similar to one found in the terramara station at Campeggine in the province of Parma. Several fragments of pins, wires, spirals, and small plates of bronze. Among iron objects, all of which were much corroded, was a spear-head (No. 24). Portions of greenish vitreous paste.

The following animals were identified among the osseous remains:—stag, ox, goat, sheep, horse, and pig.

Not only as regards the relics but also in internal structure the terramara stations on the north of the Po have been shown to be identical with those on the south side. This we have already seen in the description of Casale Zaffanella. But the point was first established by the indefatigable researches of Chierici, who, in 1881, along with a few other antiquaries, explored the stations at Bellanda and Villa Cappella in the commune of Gazzoldo, about 10 miles west of Mantua. Here all the characteristic features of the terremare—the surrounding dyke, palafitte, and orientation—were clearly established. (B. 372a.)

The best investigated terramara in the Bologna district is that at Castellaccio, about three-quarters of a mile to the south of Imola. (B. 457.) The deposits repose on an isolated elevation on the right bank of the river Santerno, and rising nearly 120 feet above its bed; but on it there are no remains of ancient stone buildings, as the name would seem to imply. The hill is of yellowish sand, belonging to the Upper Pliocene. Scarabelli, who has recently published an illustrated monograph of its peculiarities and the antiquities found on it, states that piles were numerous, though many had disappeared by decomposition, only traces of their holes being then detected. Some of the piles were large, measuring over a foot in diameter, and they were placed irregularly. No less than 26 hearths were met with at different levels, and those on the same level were from 4 to 6½ mètres apart.

The peculiarity of this terramara is that its antiquities would appear to belong to both the Stone and Bronze Ages. The flint implements included about 20 roughly-chipped tools like scrapers, some badly-made arrow-points, and saws resembling those found in the palafittes in the Mincio. Altogether 216 worked flints and about 600 chips and cores were collected. Some polished stone axes, together with four portions of perforated implements.

Among about 120 spindle-whorls of burnt clay there was only one ornamented. There were various implements of staghorn and bone, a few of the former being perforated and apparently used as axe and hammer heads like those from Gorzano. Some perforated shells are also recorded.

The pottery was precisely similar to that usually found on the well-known terramara deposits of Emilia, showing various forms of handles, horn-like projections, perforated knobs, etc.

The total number of bronze articles amounted only to seven pieces, and included a small sickle, a coltello-ascia like that from Bosisio (**Fig. 51,** No. 10), and a small dagger with two rivets—the rest being of an undetermined character. Two objects of *pietra ollare* (a small spindle-whorl and a dish turned on the wheel) and a bronze buckle were found among the disturbed beds on the surface.

Beyond the valley of the Po no decided remains of palafittes or terremare have come to light, and the obscure indications that have been recorded leave it doubtful whether they are ot a prehistoric character.* Of these the only one worthy of detailed notice here is the dwelling found near Offida, in the Piceno district (Central Italy), and described by Professor Pigorini. (B. 343b.)

About one and a half miles from Offida, in a small valley surrounded by hills, there was formerly a small lake, which has become drained by the erosion of a stream which falls into the Tresino. Here, covered with 16 feet of sand and *débris,* the Marquis Allevi found a platform 50 yards long, 15 yards wide, and 2 feet thick. Below the platform there was lake-mud, containing fresh-water shells, to the depth of 9½ feet, in which were charcoal, bones of animals, fragments of pottery, and other remains of human occupancy. This platform was constructed of large trunks deprived of their branches and laid horizontally at intervals of about four feet, above which came smaller beams irregularly laid without any order and then a layer of clay and moss. On this platform were found calcined round stones, the bottom of a dish, and some 12 fragments of other vessels, some of fine and some of coarse pottery. One bit had a recurved lip, and another was ornamented with a kind of zigzag ornamentation in incised lines. There were also about 20 pieces of copper, some of which looked like crucibles.

Extent.—As to the actual dimensions of the terramara mounds, it is difficult to procure accurate measurements, for several reasons. In many instances they are either built over by modern buildings, or there is nothing to distinguish their *débris* from the surrounding soil without making extensive excavations. Even when the site is a clearly-defined mound, as at Montale, one estimate may differ from another according as the area of the surrounding dyke is or is not included in the measurements. Generally speaking they are rectangular in form and, according to Chierici, their average superficial area is about seven acres. (B. 311, p. 105.) But their respective areas vary very much, as will be seen from the following stations, in addition to those already given, whose measurements have been accurately ascertained by competent authorities:—

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* Brizio, "La Grotta del Farne."

Casaroldo (Parma), 200 by 160 by 3·70 mètres. (B. 297, p. 360.)

Parma, 300 by 28 mètres. (Strobel e Pigorini, Seconda Relazione, p. 149.)

Castiglione di Marano (Modena), 114 by 64, and 3 mètres thick. (B. 422, p. 19.)

Pragatto (Bologna), 200 by 150, and 3 mètres thick. (B. 372, p. 138.)

In his description of Bellanda (Mantua), Chierici observes that the bacino was a rectangle 96 mètres across, giving an area of about two acres, to which he adds "ampiezza ordinaria delle terremare." (B. 372, p. 80.) On the other hand, the two whose measurements have been accurately given by Parazzi, viz. Cogozzo and Casale Zaffanella, show a superficial area of only half this size, a fact which induced Parazzi to observe that the terremare in Viadana seemed to be smaller than those of Emilia and that at Bellanda. (B. 451, p. 4.)

Number.—The total number of terramara stations in the Po valley is over 100, which are thus (approximately) distributed among the provinces:—Parma, 30; Reggio, 25; Modena, 16; Bologna, 5 or 6; Mantua, about 20; and Brescia, 8.

Relics.—More trustworthy knowledge of the social conditions and general culture of the terramaricoli is to be derived from a study of the remains of their villages than if they had come within the scope of the earliest written records. The ordinary *débris* here accumulated, such as the more imperishable portions of food refuse, stray objects, etc., are arranged in chronological sequence like geological strata, the more recent being on the surface, and the oldest at the bottom. Wherever an object of human industry happened to drop there it remained, marking in all time coming its relative place in the duration of the community. The industrial remains show that these people founded their dwellings in the early Bronze Age. The existence of a few flint implements and other objects of the Stone Age is quite in harmony with the usual overlap of the relics of dying customs in the transition period. That the weaving of cloth was largely practised by them is proved by the extraordinary variety and abundance of spindle-whorls and loom-weights. They made ornamental buttons of terra-cotta, horn, and bone; as well as pins, combs, and other objects of the latter materials. Wood was also largely used in the manufacture of a great variety of things, as handles, dishes, spoons, floorings, etc. (B. 328e.) That they worked their implements and ornaments of bronze is proved by the number of foundry objects collected, as bronze slag, stone moulds, etc. (**Fig. 83,** Nos. 14 to 17).

We have already seen that the terramaricoli had an extensive knowledge of the ceramic art. The vessels in daily use were no less varied and elegant in shape than our modern jugs, teapots, cups, bowls, basins, saucers, flower-vases, etc. Some had everted rims and the majority flat bases. The ornamentation consisted of parallel and wavy ridges, knobs (sometimes perforated), triangles, and crosses of incised grooves, circular or semi-circular impressions, etc. But most characteristic are the appendages attached to the tops of the handles (**Fig. 84,** Nos. 21 and 22), which were of the most varied and fanciful forms. These remarkable handles are not found on pottery beyond the area circumscribed by the terremare. Nor is the fully-developed *ansa lunata* found in the lake-dwellings within this area, with the exception of the stations at Peschiera, Mincio and Il Bor, in the south-east corner of Lake Garda. Rudimentary forms of these handles, such as those from the lake-dwellings of Polada (**Fig. 67,** Nos. 13 and 14), Arquà Petrarca and Fimon (**Fig. 66**), are also found in the western district of the Po valley (**Fig. 48,** No. 16). The terremare would, therefore, appear to be somewhat posterior to the earlier lake-dwellings. But, on the other hand, the later lake-dwellings (Peschiera and Mincio) were posterior to the terremare. Not only does the pottery of the palafitte at Peschiera include the characteristic *anse lunate* (**Fig. 65,** No. 26), but among its bronze relics are examples of almost every object found in the terremare, as razors, pins, sickles, knives, etc.—a fact which will be at once seen from a comparison of their respective objects here illustrated. (Compare **Figs. 63, 64,** and **65,** with **Figs. 83, 84,** and **85.**) Moreover, from this comparison a further inference will be drawn, viz. that the lake-dwelling remains contain various objects which are not found in the terremare, as fibulæ (**Fig. 64,** Nos. 8 and 22 to 25), bracelets (**Fig. 63,** Nos. 31 and 32), one-edged knives (**Fig. 64,** No. 11), torques (**Fig. 63,** Nos. 13, 19), etc., all of which are indisputably of later date than the relics of the terremare proper.

Organic Remains.—The principal food of the terramaricoli consisted of the produce derived from agricultural and pastoral farming. An exhaustive analysis of their vegetable remains has not yet been made; but, from the occasional stores of grain, chiefly in a carbonised state, and other provisions met with, they are believed to have been in the habit of eating the following seeds and fruits:—wheat (two varieties), beans, millet, acorns, beech-nuts, apples, pears, sloes, cornel-cherries, brambles, pistachio-nuts (*Staphylea pinnata),* hazel-nuts, and grapes (*Vitis vinifera*). Flax was largely cultivated, and its seeds were supposed to have been used as food, while of course its fibres were converted into thread, ropes, and cloth. Among the vegetal remains from Casale Zaffanella submitted to Professor Oreste Mattirolo in Turin, wheat and both the seeds and wood of the vine were recognised.

As regards the domestic and wild animals on which the terramaricoli subsisted, we are in possession of more definite information, owing to the persevering watchfulness of Professor Strobel. The following is his corrected list down to the year 1883 (B. 410c):—

Erinaceus europœus, L. (hedge-hog). Gorzano.
Ursus arctos L. (bear). Castellaccio, Gorzano, Campeggine, etc.
Vulpes vulg., Brisson (fox). Castellaccio, Gorzano, Montecchio, Ronchi di Viadana.
Canis familiaris, S. (domestic dog).
    var. *Spalletti,* Strob. Montecchio, Castione(?), Cogozzo(?), Casale Zaffanella.
    „ *palustris,* Rüt. Common.
    sub. var. *matris optimæ.* Gorzano, Montale, Montecchio, Demorta.
Lupus vulgaris (wolf). Castellaccio, Redù.
Meles vulgaris (badger). Montale.
Martes foina, L. (pole-cat). Gorzano.
Felis catus, L. (wild-cat). Gorzano(?), Montale(?).

Sus scrofa (*ferus*), L. (wild boar). Widely spread, but not common.

Sus palustris, Rüt. (domestic pig). Common.

Asinus africanus, Sans. (ass). Common.

Equus caballus (horse). Widely spread and not rare. The remains are of two races, one large and the other small.

Capreolus vulgaris (roe). Less common on the south side of the Po.

Cervus elaphus, L. (deer). Common.

Dama platyceros, Plinius (fallow deer). Gorzano. Very rare.

Cervus tarandus (reindeer). Gorzano (Coppi).

Hircus ægagrus, L., *palustris* (goat). Widely spread and common.

Ovis aries, L. (sheep). Emilia, Mantua, Brescia.

var. *palustris*, Rüt., *capricornis*, Can. Not rare.

„ *O. musimom.* Castellaccio.

Bos primigenius, Boj., *domesticus.* Emilia, Mantua, and Brescia. Not common.

Bos brachyceros, Rüt. Very common as domestic cattle.

Lepus timidus (hare). Gorzano (Coppi).

Mus sylvaticus (wood-mouse). Castione.

Hystrix cristata, L. (porcupine). Portion of a quill of this animal was found in the socket of an arrow-head of bronze from Campeggine.

Castor fiber, L. (beaver). Castellaccio, Cogozzo.

Frugilegus segetem (raven). Gorzano (Coppi).

Gallus domesticus, L. (domestic fowl). S. Ambrogio, Gorzano, Bismantova, Castellazzo di Fontanellato, Parma, Bozzoletto.

Ciconia alba, W. (stork). Montale.

Ardea cinerea, L, (heron). S. Ambrogio.

Anser segetum (wild-goose). S. Ambrogio, Possioncella near Viadana.

Anas boschas, L. (duck). Montale, Parma, Cogozzo.

Emys europæa, Sch. (tortoise). Gorzano, Montale, S. Ambrogio (Boni), Campeggine (Chierici), Casale Zaffanella (Parazzi).

Bufo (a species of toad).

Esox lucius, L. (pike). Parma, Casale Zaffanella (Parazzi).

As coming under the category of organic remains I may ad that a great variety of shells, both of living and fossil species, a found in the terramara deposits. Many of them are perforate especially the more ornamental fossil varieties, and were undoubtedl used as ornaments. Some of the flat shells of bivalves give tingling noise when struck, and are therefore supposed to ha been used to produce some kind of musical sound. Land an fresh-water species were also, no doubt, used as food. Cop in his monograph (vol. ii. p. 100) describes and illustrates a variet of the more striking forms collected in Gorzano; and, in summin up his list, he states that 479 were of marine origin (eith recent or fossil), 388 belonged to fresh-water species, and 31 were land shells.

From the existence of the horny cases of various kinds of insects, some living in air and others in water, and their larvæ in various stages of evolution, Pigorini adduces an argument against the supposition that the bacino was kept constantly filled with water. (Strobel, B. 88, p. 18, and 89, p. 36; Pigorini, B. 407, p. 38; Parazzi, B. 451, p. 54.)

The protracted discussion as to whether or not amber has been found in the terremare proper was finally settled by the statement of Pigorini that, in his recent explorations (1877) at Castione, it was found in the lowest stratum. ("Ora siamo certi che l'ambra si trovò in Castione sepolta nello strato infimo, e colla certezza che vi fosse penetrata nei giorni in cui lo strato stesso si formava." (B. 407, p. 51.)

As early as 1863 Strobel and Pigorini announced the discovery at Castione of a couple of amber beads, but as their position in the *débris* had not been determined, no inferences could be drawn from this discovery. In 1871 Coppi found a large one (*fusaiuola*) at Gorzano; and later, another of the same kind. One was also found at Montale, and another at Casinalbo. As these are all the records of amber up to the decided discovery of Pigorini, it is clear that it was a very scarce object among the terramaricoli. The number from Montale, however, now amounts to 16, the largest of which is 1¾ inches in diameter. (B. 279b, 298b, 311a'.)

Age.—In the spring of 1865 Pigorini explored and described a station in the district of Parma called Fontanellato, which, at the time, he considered to be a terramara containing a fascine structure belonging to the Iron Age. (B. 112.) In the excavations which were conducted here the following different strata were exposed from above downwards:—(1) 2 feet of soil; (2) a bed of alluvial deposits 4 inches thick; (3) a bed of materials similar in colour and composition to those of the ordinary terramara deposits, 1 foot 10 inches thick; (4) a mass of mixed materials 2 feet 7 inches thick, containing roots, branches, leaves, etc., mixed with clay, together with pottery, short piles, charcoal, bones of animals, shells, fruits, seeds, etc.

The objects of special interest collected were fragments of coarse pottery, made, however, on the wheel, and particularly some vessels made of *potstone;* a large stone splinter, showing marks of usage; a bronze ring, and some iron slag.

In 1883 Pigorini recurs to the remains at Fontanellato (B. 408) and explains that, owing to the great progress made in the investigations of the terramara deposits, and the additional light thrown on the subject, he has come to the conclusion that the station at Fontanellato was not a direct continuation of the terramara system which prevailed in the Bronze Age, but a "palafitta barbarica," in which he sees the practical evidence of the incursions, into the Po valley many centuries later, of the northern hordes of barbarians which gave the final *coup* to the Roman empire. That these people were conversant with such structures there is ample evidence in the analogous remains of terpen in Holland, the burgwälle and lake-dwellings of Germany, the Tószeg and other mounds in Hungary, etc. (B. 410b.)

Nor does the station at Fontanellato stand as an isolated example of these later structures. Chierici found one at Marmirolo, in the district of Reggio.* Another is recorded by Cornalia,† and Pigorini thinks that several other stations which have been more or less described belong to the same class as those in the Thrasimene district ‡ and that at Offida, near Piceno. (B. 343.) With these exceptions, there are no terramara mounds of the Iron Age, and the system is supposed to have flourished in the early Bronze Age and to have fallen completely into desuetude before the commencement of the Iron Age.

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* *Bul. Palet. It.*, 1883, p. 17.

† *Atti della Soc. It. di Sc. Nat.*, vol. vii.

‡ Brizio, "La Grotta del Farnè," p. 45.

Fourth Lecture.

SPECIAL CHARACTER OF THE REMAINS FOUND AT LA TÈNE AND IN LAKE PALADRU: LACUSTRINE AND MARINE DWELLINGS IN THE LOWER RHINE DISTRICT AND NORTH GERMANY.

LA TÈNE.

THE celebrated lacustrine station, La Tène, is situated at the north end of Lake Neuchâtel, just close to the present artificially formed outlet where the land end of its mole or dyke begins. Stretching from this point eastwards there is a gravelly elevation, some 200 yards long by 50 wide, which, before the "Correction des Eaux du Jura," formed a shallow part of the lake, and for this reason it was called among the fishermen La Tène (the shallows). As early as 1858, Col. Schwab discovered this to be the site of a rich repository of antiquities of a totally different character from those found in any of the hitherto explored Pfahlbauten. Subsequently Professor Desor directed his attention to the locality and made a collection of its antiquities, among which he announced some Gallic coins (**Fig. 92,** No. 8) and a sword-sheath ornamented with the forms of three fantastic animals (**Fig. 87,** No. 9). Further discoveries of its remarkable antiquities were made by M. Dardel-Thorens, who for many years, while resident superintendent of the Lunatic Asylum of Préfargier, situated close by, devoted his spare time to the investigation of La Tène. As the relics were associated with numerous piles there appeared to be no doubt among these antiquaries that the station was quite analogous to the ordinary pile-dwellings of the Stone and Bronze Ages, the only difference being that it represented a later age.

Notwithstanding the facilities for investigation afforded by the lowering of the waters of the lake in 1876, which had the effect of making La Tène dry land, nothing further was done till 1880, when M. E. Vouga, schoolmaster at Marin, interested himself in the matter. One reason for this neglect was the opinion that the whole area had been already so thoroughly examined by previous explorers, that nothing remained to be done. Before, however, describing the discoveries of M. Vouga, it will be necessary to look more minutely at the situation of La Tène and the nature of the substratum in which its antiquities were found.

In making a section through the La Tène elevation there is first encountered a bed of water-worn gravel and sand, varying in thickness from three or four feet to as many yards. This gravel had evidently been thrown up by the action of the waves, and in it there are no antiquities found, with the exception of occasional fragments of Roman pottery and tiles. Beneath this superficial gravel there lies a blackish bed of peat of considerable thickness, below which is the ancient lake sediment. It is on the surface of this intermediate mossy bed, and sometimes buried in it, that the objects characteristic of La Tène are found. From these stratigraphical glimpses of Nature's workings it would appear that during prehistoric times the whole low-lying district from Préfargier to the lake of Bienne was a shallow bay, which became ultimately overgrown with marsh plants and peat to the extent of forming the "Gross Moos." Scattered throughout the deposits of this quiet bay, and especially along the waterway to Bienne, are frequently found antiquities belonging to all the three ages of prehistoric times previous to the occupation of the locality by the Romans, remains of whom are, of course, also met with. Professor Desor, and others who have carefully examined the locality from a geological point of view, account for the subsequent overspreading of La Tène as the combined result of two natural causes, viz. first, the elevation of the level of the lake owing to sedimentary deposits or accidental obstruction in the channels through which the surplus water found its escape; and, second, the gradual removal, by the action of the waves, of a protective barrier in the shape of a projecting moraine of sand and gravel, which stretched outwards from Préfargier in the direction of La Sauge, and sheltered La Tène for many ages from the action of the open lake. But whatever the explanation may be, it is certain that a considerable change has taken place since these sedimentary deposits of fine silt were formed, as at the present time the amount of gravel thrown up on the shore of La Tène is so great as to advance the beach at the annual rate of two or three yards; and this occurs notwithstanding that the level of the water, owing to the operations necessitated by the "Correction des Eaux du Jura," is even lower than it was when the neighbouring lake-dwellings of the Stone and Bronze Ages flourished.

Recent Explorations.—While M. Vouga was one day making excavations near a group of piles, which he considered to have been supports for a bridge, he came upon the foundations of a wooden house, and in the course of clearing it out he made the important discovery that it had been situated on the brink of a deep channel, which had subsequently become filled up with sand and gravel. The most natural explanation was that this channel was an ancient river-bed which, when the house was constructed, formed the outlet of the lake. With this idea paramount in his mind, Vouga determined to trace out its direction and bearings. About 20 yards farther up—*i.e.* in the direction of the lake—he came upon the remains of a second wooden house, with its foundation beams still *in situ*, and two of its containing walls (which had evidently fallen over) lying one over the other. Here the bank of the channel formed a steep descent of 10 feet deep. The floor of this structure was formed of two square-cut beams, each over 16 feet in length and 8 inches in thickness, having a series of closely-set mortised holes for transverse beams. Its breadth was 9 feet 2 inches, and it lay 2½ feet below the surface, and about 7 feet higher than the bottom of the river. The two sides of the building were formed of three beams corresponding in length with that of the flooring, and about 2½ feet apart, and having transverse mountings and a trellis-work of branches. One of these had apparently fallen into the river, as its end reached nearly to the bottom of the channel. Pursuing his investigations still in the direction of the lake, he came upon the remains of a third building, near which were the piles of a second bridge. The space between the two bridges was about 100 yards, and, judging from the position of the piles, this bridge was directed to the same point as the former—probably La Sauge, at the opposite corner of the lake. These bridges were supported on a succession of parallel rows of oak piles 4 to 6 inches in diameter, and placed at intervals of 3 to 20 yards; and each row contained five or six piles, from half a foot to 3 feet apart. About 50 yards above the second bridge a fourth dwelling was encountered, but it appeared to have been already pillaged of its contents. Near this our explorer proceeded to clear a portion of the bed of the river, and lying in the mud and gravel at a depth of 10 feet from the original surface he found a large quantity of antiquities—swords, lances, axes, chains, razors, various wooden implements, fragments of a large vase, the entire wheel and other parts of a chariot, together with the bones of men, horses, and oxen. A fifth building was subsequently discovered between the third and fourth, so that we have here the evidence of a row of five houses situated along the right bank of the ancient river, and all within a distance of 200 yards.

On the left bank of this supposed river only one habitation, opposite No. 1, was discovered, which M. Vouga thought had already been pillaged. It was reported that near this spot several human skeletons had been discovered, one of which had a rope round the neck! Below this the channel becomes deeply buried, and the superficial gravel attains the depth of some ten feet; but, nevertheless, Vouga succeeded in making excavations which decided the chronological sequence of the Roman and Gallic remains. "It was," says he, "in the midst of these gravels that I found the layer containing Roman remains—tiles and fragments of pottery, nails, etc.—at a height of two and a half to three feet above the Gallic objects." (B. 428, p. 13.) These Gallic objects consisted of the well-known fibulæ and other articles characteristic of La Tène, so that superposition clearly indicates the Roman occupation to be posterior to that of its original constructors.

M. Vouga believes that the channel, along the banks of which he found the remains of so many houses, was the right branch of two outlets which at that time existed, and which united lower down to form the Thielle. The left branch was nearer the rising ground towards Epagnier, but it is now covered over with gravel, and has never yet been examined. Some 300 or 400 yards lower down there are some gravel pits, which are occasionally worked for road metal, in which I saw in the summer of 1886 a great many piles, singly and in groups, cropping up through a black peaty deposit underneath the gravel. I mentioned the matter to M. Vouga, and he informed me that the few things found there indicate a Gallo-Roman period.

According to M. Vouga, the site of La Tène station extended from the south bank of the outlet to the small island formed by its two branches before they became united. The upper part of this island, now denuded of its peaty deposits by the action of the waves, forms part of the lake. This denuding process is still going on at the margin of the lake all the way from La Tène to Préfargier. Large masses of the ancient sedimentary deposits, containing piles and relics of the lake-dwellers, become undermined and broken up by the waves, leaving their more solid relics, such as stone hatchets, mixed with the gravel. These are often thrown up on the beach, and in this way many beautiful jade hatchets have been picked up from the sites of the four lake-dwellings now almost entirely disintegrated, which existed along the north shore from La Tène to Préfargier. It is in the gravel at the upper end of La Tène that most of the coins have been collected.

The success attending Vouga's excavations induced M. Borel, on behalf of the Museum of Neuchâtel, to make further excavations along the banks and bed of the ancient river discovered by the former, but without much success. Finally, in 1884, the Cantonal Government having granted to the Historical Society the exclusive right of conducting explorations at La Tène, this society undertook fresh excavations under the management of Messrs. Vouga and W. Wavre. During these researches portions of a gold torque and some gold coins were the principal finds. These coins are valuable inasmuch as they were found *in situ*, and not, as most of the others, among the shifting gravel.

From Keller's description (B. 126) of the earlier discoveries on La Tène it appears that Col. Schwab, on removing some large mortised beams, found many weapons and other antiquities all huddled together. In the light of Vouga's researches it is probable that this spot was a dwelling similar to those I have already described, as we are told that there were three beams of fir wood, from 15 to 20 feet long, lying parallel to each other and a few feet apart. These beams rested on upright piles, and contained a series of triangular holes as if for the tenons of wooden superstructures.

Relics.—Like the fate of most lacustrine remains, those from La Tène have been widely scattered. Many are deposited in the Cantonal Museums of Bienne, Neuchâtel, and Berne. The Gross collection, being now public property, finds also a temporary lodgment in a room in the Federal Hall in the latter town. A few, including some of the most interesting relics, have been secured for the Museum of Geneva. The largest of the private collections are those of Messrs. Vouga, of Marin, and Dardel-Thorens, of St. Blaise. With the exception of the articles in the possession of the latter gentleman (which are, however, copiously illustrated in *Antiqua* and the works of Vouga and Gross), I have studied more than once all these collections. As the principal objects have already been more or less described and illustrated in the excellent works of Keller, Desor, Gross, and Vouga, I wish here to acknowledge that in the production of the accompanying illustrations I have made free use of all these publications, either to rectify my own sketches, or (and this more especially) to give me the correct size of the objects—a point which is rather troublesome to attain through a glass case when, as it often happens as regards the smaller museums, authoritative officials may not be at hand to give access to the cases.

Owing to the peaty nature of the matrix in which the relics from La Tène were embedded they are in a remarkably good state of preservation. They consist chiefly of iron implements and weapons, presenting a striking difference not only in material but also in form and style of manufacture from any found in the ordinary lake-dwellings. Articles of bronze are sparingly met with, and they are, with one or two exceptions, very dissimilar to those from the true palafittes of the Bronze Age. In giving a short description of these relics it will be convenient to group them under the following heads:—(1) Arms; (2) Implements and Utensils; (3) Articles of Ornament and Dress; (4) Horse-Trappings and Waggons; (5) Money, and Objects of Amusement, etc.; (6) Osseous Remains.

1. Arms.—*Swords* (**Fig. 87**).—The swords from La Tène, which now number considerably over 100, are all made after one characteristic type. They vary in total length from 30 to 38 inches (or even more), of which the handles occupy 4 to 6½

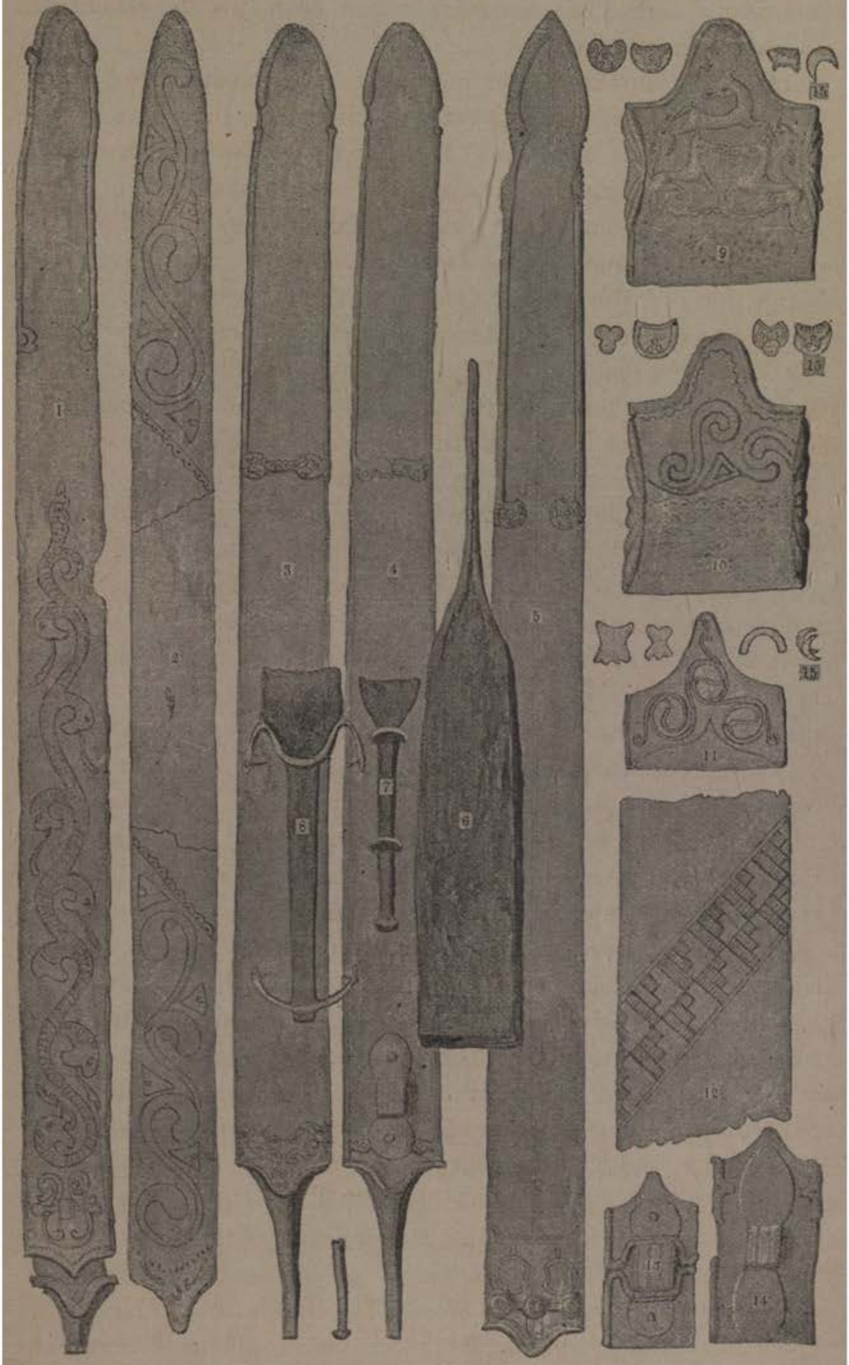
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Fig. 87.—La Tène. Nos. 9 to 12, and 15 = ½, and the rest = ¼ real size.

inches. The blade is always double-edged, generally without a defined median ridge, and scarcely tapers in its whole length till within a few inches of the extremity, when it gradually forms a round blunt tip. It is devoid of ornamentation, except in one or two instances where parallel grooves run along the median line, or the surface becomes thickly dotted with small impressions. Others again have small incised figures upon them (No. 15), but these are supposed to be makers' marks—an interpretation which seems to be corroborated from the fact that those bearing such marks are of a superior quality. The handle is separated from the blade by a prominent curved ridge attached to the hilt of the blade, into the concave side of which the end of the scabbard neatly fits. Although all the swords hitherto found at La Tène have this dividing ridge in the form of a graceful curve such as is represented in the illustrations, I may remark that some of the same type from other stations are straight. What now remains of the handle is merely the central tang, over which there was a grip of horn or wood. On this tang were sometimes small transverse plaques for fastening the handle (No. 8); and Vouga figures one with two small circles from a grave of the Iron Age at Bevaix, which I here reproduce (No. 7) on account of its striking similarity to the sword-handles from Lisnacroghera. (See **Fig. 124**, Nos. 1 and 2.)

The sheaths are formed of two plates of iron (rarely bronze), one of which overlaps the other at the margins, where they are riveted together. Sometimes these plates are strengthened by one or more cross ridges, and about the lower third a raised bead begins which runs round the tip. These attachments often assume an ornamental character (Nos. 3, 4, and 5). The upper surface of the sheath is also generally ornamented with a variety of curious designs, in which spiral and recurring scroll patterns play a conspicuous part (Nos. 3, 10, and 11). But perhaps the most remarkable design is that of three fantastic animals (No. 9), which, from their resemblance to the figures on Gallic coins, first led Desor to the conclusion that the weapons had a similar origin. Only three sheaths are known to have been ornamented along their entire length—viz. Nos. 1, 2, and 12. That on No. 12 was repeated three times at regular intervals. The underside of the sheath has always a suspension clasp, which assumes various elegant shapes (Nos. 4, 13, and 14). In one instance the upper sheath-plate was of bronze, and another had both plates of iron, but the surrounding bead was of bronze. No. 6 represents a piece of iron (being one of about a dozen similar pieces found at La Tène), which is supposed to be the rudimentary stage of the sword-blade.

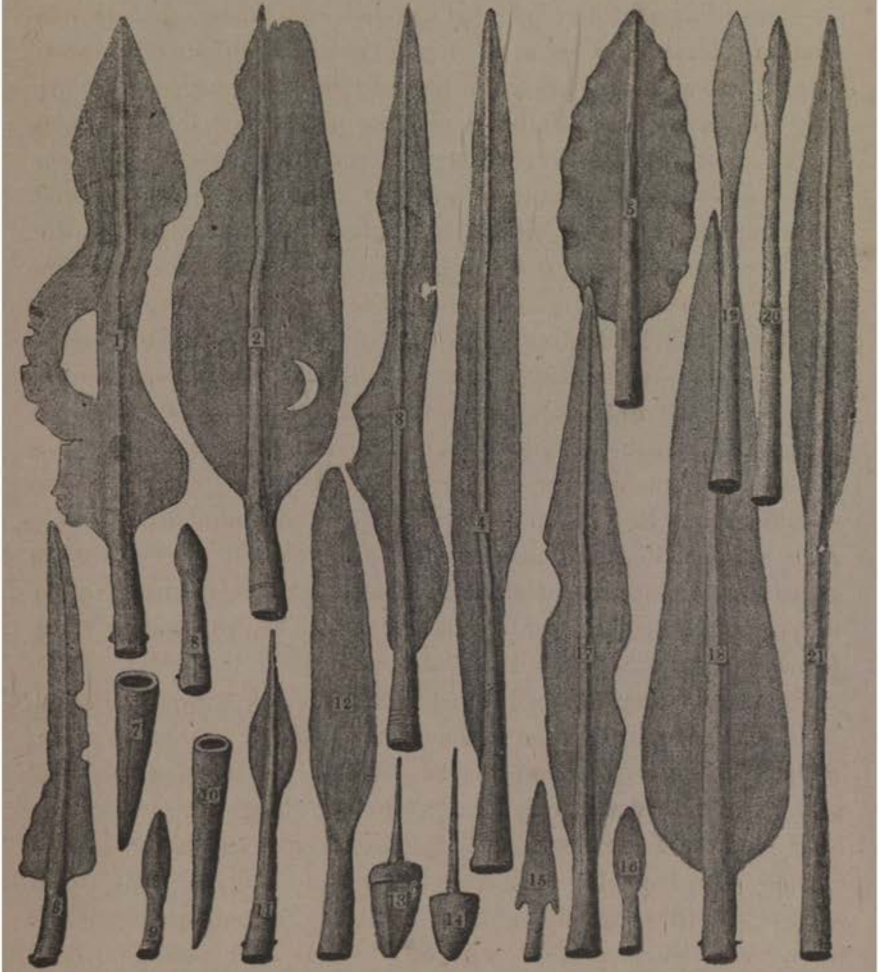

Fig. 88.—La Tène. Nos. 7, 10, 13, and 14 = ⅓, and the rest = ¼ real size.

Lance and Javelin Heads (**Fig. 88**).—These weapons are extremely varied in shape and size, as may be seen from a glance at the illustrations. They all have sockets, and the smallness of the bore at once distinguishes them from Roman weapons of the same class. Sometimes the socket is short, while the blade is large and leaf-shaped, and at other times it runs nearly the whole length of the latter. Two nail holes, and sometimes small prominences, are seen at the lower end of the socket, by which the wooden handle was more firmly fastened. In a few instances (No. 12) there is no median ridge, but generally this is a prominent feature extending the whole length of the blade, and sometimes it assumes a triangular form, like that in our modern bayonet (Nos. 3, 4, etc.). Another peculiarity of some of these weapons is the cutting away of segments and semilunar portions, either at the edges (Nos. 1, 3, and 17) or in the body of the blade (Nos. 1 and 2). One fine weapon has an oval blade with a crenated or wavy edge (No. 5).

The butt end of the wooden handle was protected by an iron knob (Nos. 7, 10, 13, and 14), either simply conical or multilateral, above which there was a neat ferule (No. 13).

Arrow-heads.—It is only in the later excavations that a few arrow-points have come to light. Like the spear-heads, they are all socketed (Nos. 15 and 16).

Shields, etc. (**Fig. 89**).—Several objects have been found at La Tène which must be considered as shield-mountings. The umbo was of thin iron, arched in the centre, and attached to the shield by large studs or sometimes small nails (No. 1). The handle was made of a curved iron rod riveted to two rectangular plates of iron attached to the shield (No. 2). Some large handsome plaques of bronze, of a flamboyant character, are supposed to have been ornaments on the face of the shield (Nos. 3 and 4), of which about half a dozen altogether have been found. Besides these there are several discs and other objects of bronze (Nos. 5, 8, 9 to 11, and 21), many of which were probably ornaments for horse-harness, and there are some which Dr. Gross conjectures to have been ornaments for helmets. (B. 446, p. 28.) The curious object of thin bronze represented by No. 20 is also supposed to be an ornament for a helmet.

2. Implements and Utensils.—*Hatchets* (**Fig. 90**).—Though comparatively rare, the hatchets are of various kinds (only about twenty have been hitherto found). One form (Nos. 1, 2, and 7) reminds one of the winged celt of the Bronze Age. The former, however, has only two wings, instead of four as in the latter, and its cutting edge is more expanded. Others are like our modern axes and adzes (Nos. 4, 5, and 6). One of this type is

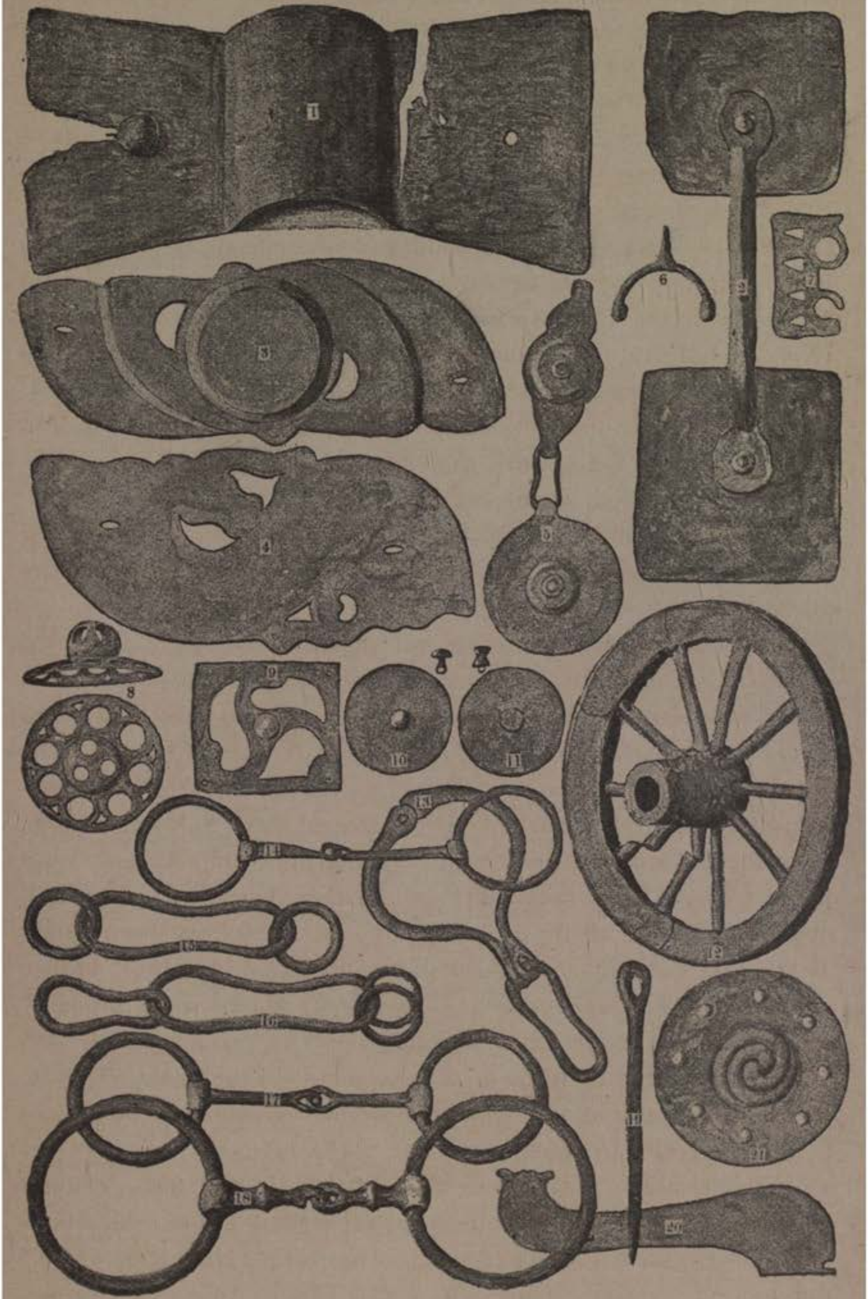
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Fig. 89.—LA TÈNE. Nos. $8 = \frac{1}{2}$, $20 = \frac{1}{5}$, $12 =$ about $\frac{1}{20}$, and the rest $= \frac{1}{4}$ real size.

made of bronze, but of so diminutive a size as to give rise to the idea that it was a toy (**Fig. 91**, No. 31).

Chisels and Gouges.—These tools differ only from those of the Bronze Age in being made of iron. They are in considerable numbers (**Fig. 90**, Nos. 33 and 34).

Hammers.—Only a very few hammers are recorded; they are small, and generally hafted by means of a central hole (No. 22). The almost entire absence of implements from La Tène, required in the forging of iron, is somewhat remarkable, and in striking contrast with the number of foundry materials collected from the palafittes of "*le bel âge du bronze.*"

Saws.—Also sparingly represented. Two found by Vouga had handles, one of horn (No. 25) and the other of wood (No. 24). Another has a solid handle of iron, and terminates at the other end in a curious raised hook (No. 29).

File.—Only one object of this class (No. 37) is recorded.

Shears. — Three of these implements are here illustrated (Nos. 15, 16, and 17), from which it will be seen that they are precisely similar to those still used for sheep-shearing. They are elegant in shape, and some even still retain their elasticity. The number collected from La Tène is over a dozen.

Sickles and Scythes.—The few sickles recorded resemble those of modern times, and some of them had teeth. Scythes, more numerous than the sickles, vary in size from 14 to 20 inches in length, and 1½ to 3 inches in breadth. They were hafted by a crooked tang and a ring, precisely like those still in use (Nos. 30 and 32).

Knives.—As regards style and ornamentation, the knives of the Iron Age are greatly inferior to those of the preceding age Their size and special characters are sufficiently shown in the illustrations (Nos. 8 to 12). One, like the saw already noticed, has a peculiar hook at the point (No. 23).

Razors.—The so-called razors are short, thick, and heavy blades with a rounded cutting edge, and a small prolongation as a handle (Nos. 18, 27, and 28). One of these implements was found adhering by its rust to a pair of shears (Nos. 17 and 18).

Pruning Hooks.—Under this category I reckon some large cutting implements in the form of a bent knife, similar to that in present use for cutting hedges. The one here figured from

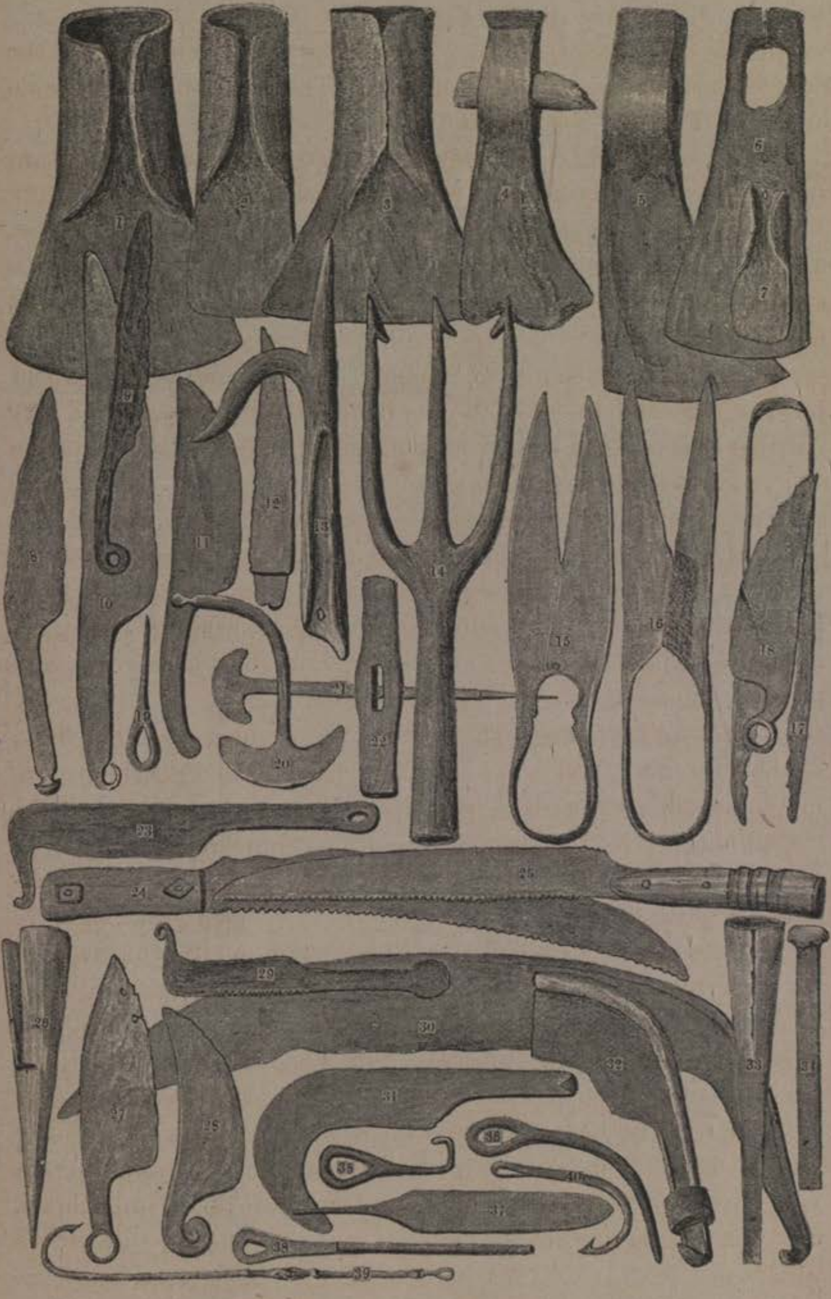
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Fig. 90.—La Tène. All ¼ real size.

La Tène (No. 31) is very similar to those found on some of the palafittes in Lake Constance. (See **Fig. 32**, No. 11.)

Pincers.—Pincers are of bronze and iron, and vary considerably both in size and form, as may be seen from the illustrations (**Fig. 91,** No. 11 to 14).

Pots and Dishes.—Of earthenware only a few fragments have come to light, and it is said to be of a totally different kind from that of the true palafittes. It is black and coarse, and shows no evidence of having been made on the wheel; but as to this there appears to be difference of opinion. (B. 428, p. 27, and 446, p. 48.) In addition to this kind, however, there are usually found on the surface of the peaty bed and in the superimposed gravel beds fragments of tiles, pottery, etc., the Roman origin of which cannot be mistaken; but such industrial remains, according to the explorers, are more superficial, and, consequently, posterior to the Gallic remains. (B. 428, p. 27.)

On the other hand, La Tène has furnished several large pots of beaten bronze, with rims and ring-handles of iron (**Fig. 92,** No. 19), some bronze cups (No. 18), a large iron ladle (No. 20), and one or two chains with large hooks, probably pot-hangers (No. 1). The cup here represented was found on the shore in the vicinity of La Tène, but it is supposed to have come from this station.*

Fishing Materials (**Fig. 90**).—Among this class of objects are some large spears with two or three prongs (No. 14), fishing-hooks of bronze and iron (Nos. 39 and 40), and some implements like the iron tips of boating gaffs (Nos. 13 and 26).

Diverse.—Hammerstones, polishers, and corn-grinders are like those used in the preceding ages.

3. Objects of Ornament and Dress.—As regards the objects coming under this category, if we exclude the fibulæ and torques, which we now know to have been worn by men as well as women, it is noteworthy that those peculiar to female adornment are extremely rare, if not entirely awanting—a fact which strongly supports the theory that this station was a military fort.

Fibulæ (**Fig. 91**).—The number of fibulæ from La Tène now amounts to several hundreds. They are all made on one principle, viz. that of our modern safety-pins. This principle is simply an evolutionary stage of the function of the straight pin, by which the point is bent round so as to meet the

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* *Antiqua*, 1886, p. 65.

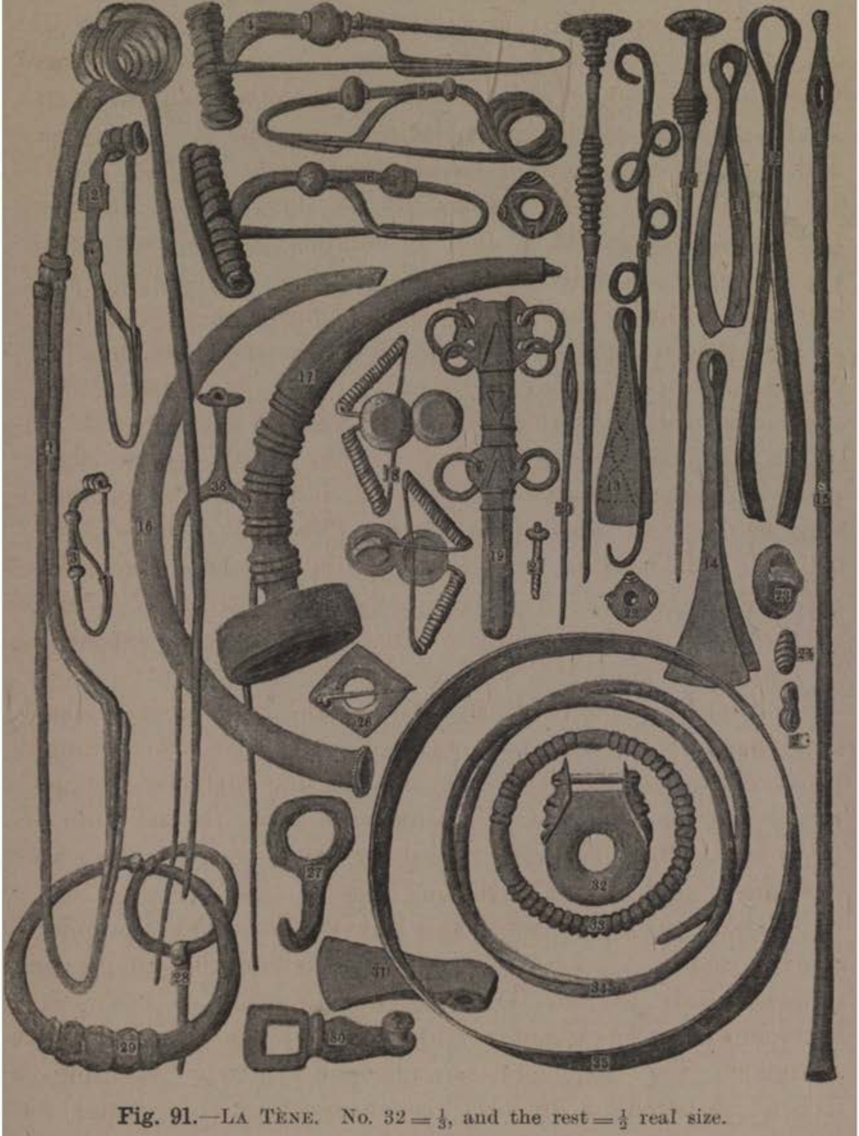
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Fig. 91.—La Tène. No. 32 = $\frac{1}{3}$, and the rest = $\frac{1}{2}$ real size.

top after having subjected the stem to several twists so as to give it elasticity. In the part corresponding to the top of the pin there is a catch for the point when fastened. The ornamentation on the upper part and the number of spiral twists on the stem are so varied that each fibula has a distinct individuality of its own, and no two specimens exactly alike have ever yet been found. Their average size is from two to six inches in length, but sometimes they exceed this, as in one here figured (No. 1), which is 10½ inches in length. They are almost exclusively made of iron (Nos. 1 to 6), the exceptions being one or two of bronze (Nos. 18 and 26), and a small circular-shaped brooch of gold (B. 428, p. 28), which are somewhat analogous to those of the Hallstadt period.

Pins, Needles, etc.—The ornamental pins are few in number, and generally made of bronze. Of four here figured (Nos. 8, 9, 10, and 36) one has a double stem, and is so similar to some half-dozen found in the Pfahlbauten of the Bronze Age that it is more likely to be a stray object from the latter than a relic of La Tène. Nor is this at all improbable, as we have already seen that there were several of these stations quite in the vicinity of La Tène, the relic-beds of which have become almost entirely disintegrated by the waves.

A remarkable object, found by Vouga, consists of an ornamental bronze tube, closed at one end, and having six movable rings symmetrically arranged (No. 19). There can be no doubt this was a needle-holder, as it contained a well-formed needle of iron (No. 20). Another curious object, having an eye like that of a needle, terminating in an elongated bulb instead of a sharp point, is represented by No. 15.

Buckles, Rings, etc.—A large assortment of iron clasps (Nos. 27 and 30), buckles (Nos. 28 and 32), rings (No. 33), etc., is to be found in all the collections from La Tène. There are also to be met with a few beads and buttons of bronze (No. 23), and some glass beads of a pretty blue colour, or variegated with blue, yellow, and white (Nos. 22, 24, and 25). One has part of a bronze twisted wire passing through it (No. 21).

Bracelets.—In striking contrast to the fibulæ, bracelets are very rare. Dr. Gross figures one of bronze wire; another of an iron rod, with the inside flattened; and a third of iron plate, riveted, forming a hollow tube, reminding one of the ornamental hollow rings of the Bronze Age. (B. 446, Pl. x. 17, 18, and 27.) Of the two here figured (Nos. 34 and 35), one is a spiral rod, and the other a flat band, both of iron. Fragments of glass bracelets, in the form of a flat band, having the outside ornamented with wavy corrugations, have also been found. (B. 126, p. 294.)

Neck-Rings.—Several portions of massive neck rings, precisely similar to those represented on ancient statuary as peculiar to distinguished Gallic warriors, as, for example, that on the neck of the "Dying Gladiator" in Rome, have been found at La Tène. They appear to have been made of two symmetrical portions, which, when worn, were united at the back of the neck, and then formed a large penannular ring, with an expanded bulb at each end (Nos. 16 and 17). They were sometimes plain rings, but generally they were more or less worked into some artistic pattern. That represented on the dying gladiator is distinctly seen to be twisted spirally immediately above the terminal bulbs. Of the two here represented, one (No. 16) is of gold, and weighs 72·90 grammes, and the other of bronze (No. 17).

4. HORSE-TRAPPINGS, WAGGONS, ETC.—Among the objects under this class we have not only bridle-bits (**Fig. 89,** Nos. 14 to 18), spurs (No. 6), various discs and other objects of bronze, supposed to have been ornaments on horse-harness (Nos. 5, 7, 8, 10, 11, and 21), but the actual remains of waggons, as wheels (No. 12), part of the wooden pole, linch-pins (No. 19), and other attachments. The wheel here figured shows a nave with 10 spokes and fellies, which are bound together by an iron hoop, precisely similar to the wheels now in use. "La roue entière," writes its discoverer, "a un mètre de diamètre; trouvée en compagnie d'épées gauloises, elle avait sur le moyeu un umbo de bouclier. Le cercle de fer qui l'entoure, d'environ un centimètre d'épaisseur, a 5 centimètres de largeur, le moyeu a 60 centimètres de longueur, il est formé de deux pièces, reliées de chaque côté par un ou deux petits cercles. Les rais sont en chêne au nombre de dix et la jante est, ou plutôt était, d'une seule pièce courbée et paraît de frêne; elle avait été raccommodée et la pièce est assujettie au moyen d'un clou et d'une embrasse de fer.

"Elle était encore entière, mais, en la transportant, quelques rais tombèrent et comme je ne pus pas la mettre immédiatement et entièrement dans l'eau, la jante se retira en peu de jours, laissant un espace entre le bois et le fer, de sorte que, quand je voulus mettre la roue entière dans son bassin de zinc, elle se sépara en plusieurs morceaux.

"Dans la même couche, mais dans la partie inférieure, puisqu'elle allait en pente, on trouvait des parties d'autres roues, des rais, moyeux calcinés, des manches de haches droits ou coudés pour celts, des parties de bois de lances, des poches en bois avec manches des fragments de grandes écuelles en bois, etc., de grandes et fortes poutres avec mortaises." (B. 428, p. 22.)

The fragments of this interesting relic are now carefully preserved in liquid in a large trough in the Museum at Neuchâtel.

The number of bridle-bits (excluding objects represented by Nos. 15 and 16, which are also supposed to have been used for this purpose) amounts to about a dozen. They are all made of well-beaten iron, with the exception of one (No. 17) which has a superficial layer of bronze over the iron, and have large side-rings, and a central mouth-piece divided into two symmetrical halves.

5. MONEY, OBJECTS OF AMUSEMENT, ETC.—*Coins.*—But perhaps the most interesting feature of La Tène is the discovery of coins among its strange assortment of relics. Some of these are Roman, but others are undoubtedly of Gallic origin, being identical with those otherwise known to have been current among the various tribes in Gaul, prior to any intervention in their affairs by the Romans. In most cases they were picked up on the surface or amongst constantly shifting gravel, and of course no conclusive inferences could be drawn from them. This uncertainty is now, however, removed by the discovery of two gold pieces at a depth of 10 feet below the present surface, and associated with the usual characteristic objects of La Tène. "En creusant à la drague," says Vouga, "les pêcheurs de M. Schwab ont découvert une monnaie d'or et plusieurs monnaies d'argent et de potin ou de bronze. Plus tard, M. Alexis Dardel et d'autres personnes en ont aussi trouvé en assez grand nombre, surtout sur la tourbe et sur les bords du lac où les vagues les entraînaient, et une quantité de monnaies romaines avec des monnaies de Marseille, de Nîmes, de Lyon, de Vienne. Le plus grand nombre a dû se trouver sur l'île, entre les deux bras de la Thielle; mais de là, à mesure que le terrain était enlevé, ces monnaies étaient balayées et entraînées au bord avec les graviers.

"Comme elles se trouvent toutes pêle-mêle, on ne peut en tirer des conclusions bien sûres. Il n'en est pas de même de deux

monnaies en or trouvées à trois mètres de profondeur avec les objets mêmes de la Tène, en février, 1884; ce sont, d'après les

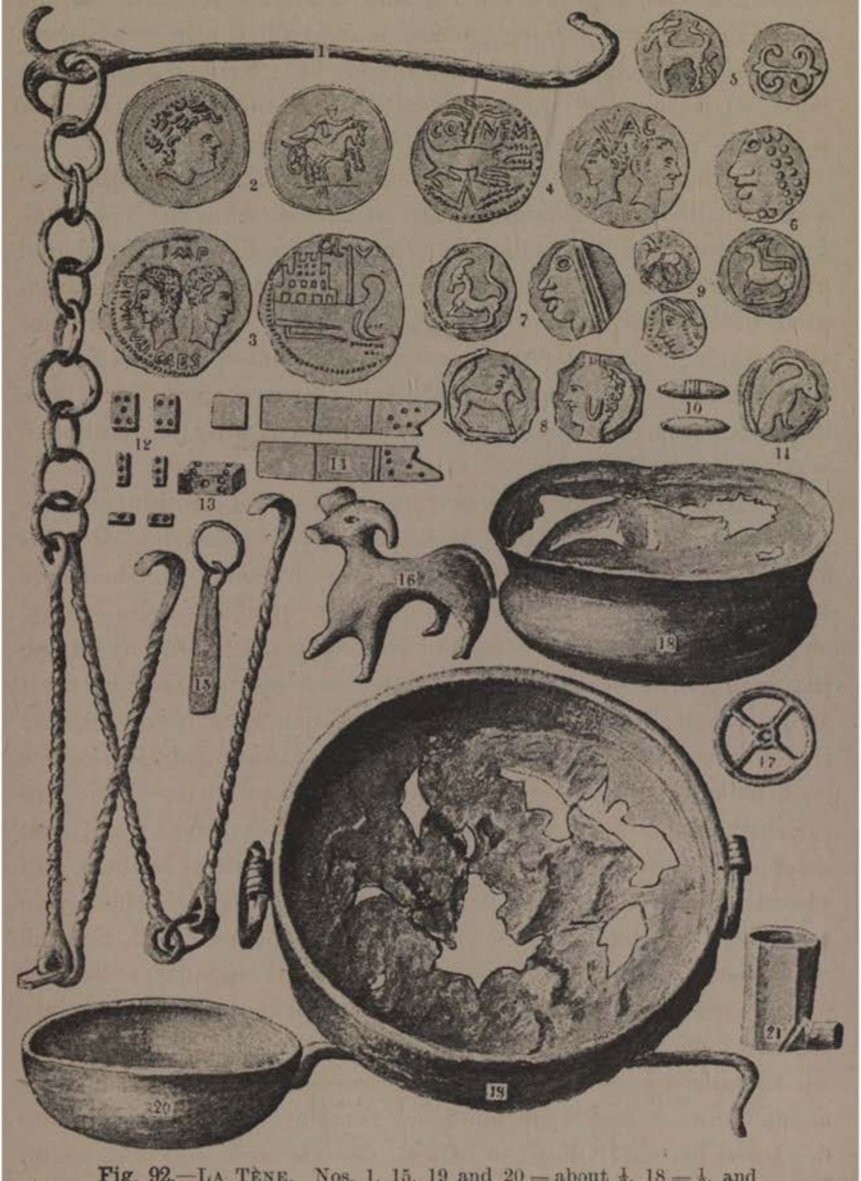

Fig. 92.—La Tène. Nos. 1, 15, 19 and 20 = about $\frac{1}{6}$, 18 = $\frac{1}{3}$, and the rest = $\frac{2}{3}$ real size.

descriptions qu'en a faites M. le Dr. Trachsel, de Lausanne, qui les croit Carnutes, du pays Chartrain. Une monnaie gauloise, en or pâle, concave, du poids de 7.783 grammes (**Fig. 92**, No. 2):

A. Tête à bandeau royal; R. Aurige conduisant un char attelé de deux chevaux; à l'exergue, inscription étrusque ou grecque, indistincte." (B. 428, p. 29.) The other coin is very like the above in every respect, except that it is smaller, being only about one quarter of its weight.

The gold coins are rare, only seven in all, according to Vouga, being recorded. One, in the Museum of Bienne, is described by Keller (B. 126, p. 302, and Pl. xv. 34) as a bad imitation of the Macedonian coins of Philip. Another (described in the *Anzeiger* for 1883, p. 401) is similar to **Fig. 92,** No. 2. A fifth is a fragment, and the remaining two consist of small elongated rolls of gold (No. 10).*

Besides the gold coins from La Tène, there are about 100 of silver, and about the same number of bronze or potin (a mixture of copper, tin, and lead), representing a great variety of coinages, both native and foreign (Nos. 3 to 9, and 11).

Dr. Gross, having submitted some specimens of these coins, intended as illustrations for his work on La Tène, to M. A. de Barthelémy, publishes the following as the opinion of this eminent numismatist as to their date:—

" En résumé les monnaies dessinées sur la planche XI, à l'exception des Nos. 23 et 24 [gold coins] qui, à cause de leur métal, ont eu un cours prolongé, sont de la seconde moitié du premier siècle avant l'ère chrétienne, principalement de la fin." (B. 446, p. 47.)

Amusements.—Among objects of this nature are several dice, some of bronze and others of bone (Nos. 12 to 14). Also, about a dozen small stones of the size of ordinary marbles, and perfectly round, except on one side, where there is a segment, as it were, cut off, are supposed to have been used for some kind of game.

Diverse.—In concluding this summary of the relics from La Tène, I have merely to mention as unclassified objects a four-footed figurine and a small wheel, both of bronze, and in the collection of Mr. Dardel (Nos. 16 and 17). Dr. Gross describes a bronze object resembling a tobacco-pipe (No. 21) which, he believes, was found on this station.

6. Osseous Remains.—To these relics is further to be added a large quantity of the osseous remains of men and domestic

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* *Antiqua*, 1884, p. 128; and *Bul. de la Soc. suisse de Num.*, 1884, No. 7.

animals. Of the circumstances in which the earlier finds of this description were made we have not very definite information. Keller, writing in 1866 (B. 126, p. 295), speaks of a basketful of human bones representing some eight individuals; and Desor about the same time found a human skull, which he figures in his work on the palafittes. (B. 95.) M. Vouga, however, gives precise and most interesting information regarding the conditions in which he encountered the osseous remains of human beings, as well as those of the horse, ox, pig, and dog.

We have already seen how M. Vouga came upon the *débris* of a series of wooden houses constructed on the banks of an ancient river. Referring to these establishments he thus writes:—

"Devant le premier établissement je trouvai un crâne entier de femme. Devant le second, je trouvai pareillement les ossements de trois ou quatre personnes et trois crânes, dont un portait les traces de coups d'épée sur le sommet; un second était remarquable par sa déformité et l'extension de la partie postérieure. Devant le quatrième, deux mâchoires inférieures et les ossements d'une trentaine de personnes, avec un très grand nombre d'os de chevaux, de bœufs, et de porcs. Devant le troisième, un crâne de chien grand et entier. Devant le cinquième, trois squelettes entiers dont un portait une corde au cou (?).

"Outres ces crânes et ces ossements dont je puis indiquer la provenance, il a été trouvé un grand nombre d'autres squelettes, d'ossements divers, de crânes de chevaux appartenant à une petite race.

"Je ne pourrais pas garantir l'âge de tous les squelettes, puisque, comme je l'ai dit en commençant, deux doivent être bourguignons, ayant retrouvé l'emplacement de la tombe avec un poignard de cette époque, et que six autres se sont trouvés à mi-hauteur, non loin d'un chénau en bois, et que la couche romaine paraissait s'incliner vers ce côté-là." (B. 428, p. 31.)

CONCLUDING REMARKS ON LA TÈNE.—In face of the above facts, the opinion of the earlier investigators that La Tène was an ordinary palafitte of the Iron Age, analogous to the lake-villages of the preceding ages, can no longer be entertained. Its geographical position, commanding the great highway between Constance and Geneva, and the vast preponderance of warlike weapons among its relics, clearly point to its having been a military station or outlook. Nor does it require much penetration to learn from its present ruins something of its final fate. The quantity of human bones representing some 30 or 40 individuals, some with gashes on the tops of their skulls; the number of abandoned swords, still in their scabbards; the incongruous medley of relics found by Vouga at the bottom of the ancient river-bed—all indicate that its capture by an enemy was sudden and the struggle fierce. The discovery of Roman remains, such as coins, tiles, pottery, bricks (one with the mark of the 21st legion, "Rapax"),* on and around La Tène, leave little doubt that its conquerors were the Romans.

Literature.—B. 22, 31, 72, 95, 119, 126, 419, 420*a*′, 420*b*′, 420*c*, 428, 434*a*, 446, 449*a*″, and 463*c*. Also Virchow on the human remains in vols. xv. and xvi., *Zeit. für Ethn. Verhand.*

LAKE PALADRU.

From time immemorial a legend prevailed among the inhabitants around Lake Paladru that a city had been buried in its waters—a catastrophe brought about by the maledictions of the monks of the neighbouring Carthusian establishment of Sylve Bénite. On the 24th September, 1864, M. Vallier, of Grenoble, and some friends arranged a boating excursion for the purpose of examining the lake as to the reported existence of piles in it, with the view of accounting for the currency of the above legend, and found no less than six different sites where piles were to be seen projecting more or less from the mud. These were supposed to be the remains of lacustrine villages of which the following particulars were ascertained:—

1. Station des Grands Roseaux.—This station was situated near the head of the lake, and about two hundred yards from shore; depth of water from one to two feet; piles sometimes three feet apart, and sometimes much less; over 150 were counted.

2. Stat. de l'Ile de Loyasse.—Two hundred and fifty yards from the former, and about 100 yards from shore. Only about twenty piles were counted.

3. Stat. de la Genevrière.—About 600 yards farther on and 70 yards from shore. About twenty piles counted.

4. Stat. de la Neyre.—About 200 yards from the preceding, and close to the shore.

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* *Rev. archéologique*, 1884, p. 194.

5. STAT. DU PLÂTRE.—About thirty piles counted in water from 10 to 13 feet deep.

6. STAT. DU PUITS DES CARPES.—Fifty or sixty piles observed close to each other and about 20 yards from the shore.

These indications of pile-dwellings, though strengthened by further observations by M. Vallier in the following year, really contributed little to the elucidation of the problem as to the period to which they belonged; so that the work of M. Vallier, "La Légende de la Ville d'Ars sur les Bords du Lac de Paladru," leaves the question much in the same position as it was left by Professor Fournet, who had already suggested, in 1860,* that the legend of the buried city had its origin in the former existence of lake-dwellings. It remained to M. Ernest Chantre, of Lyons, to make the first practical investigations to clear up the mystery. To this line of research he was led by the encouragement and knowledge he had received at the first meeting of the International Congress of Prehistoric Archæology, held at Neuchâtel, in 1866, when he had an opportunity of being initiated by Professor Desor and others in lacustrine research. His first efforts, an account of which was published n the *Matériaux* for 1867, showed that two of the stations mentioned by M. Vallier belonged to the Iron Age. Learning then that engineering works were in progress for regulating the outflow of the waters of this lake, which would have the effect of lowering its level, M. Chantre deferred his proposed excavations till these more favourable conditions should be accomplished. His subsequent investigations, conducted in the autumn of 1870, were confined to the first-named station (Grands Roseaux), which, from his former experience, gave greater promise of archæological results. From it he had already picked up some bones of the ox, pig, stag, etc., the kernels of a species of small cherry and of two kinds of plums, fragments of pottery of a different kind from any found in the Swiss lake-dwellings, an iron knife, and a wooden comb. Owing to the lowering of the lake the station was now (1870) a foot above water, and it could be easily examined by the spade on *terra firma*. In the excavations which ensued the following strata were met with:—(1) Eight inches of peaty mud and roots of water plants; (2) About eighteen inches of peat containing bits of worked wood and bones; (3) Ten inches of peat containing bones, fragments of pottery, and a great variety of antiquities; (4) Underneath this peat was the whitish lake sediment known as shell-marl.

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* *Acad. de Lyon*, tome xi. p. 229.

The area occupied by the piles and wooden beams was about 1,600 square yards in extent, and of a somewhat circular shape. The tops of the piles were water-worn, and projected above the mud from one foot to one foot and a half. They were made of the stems of trees from 10 to 16 feet long, and 7½ to 15 inches in diameter, some being squared and pointed with the hatchet, and most of them penetrated to the shell-marl. Their distance from each other varied very much. Many were observed to be in groups of four, rectangularly placed, with cross timbers stretching between them, thus forming a series of square or rectangular chambers. The cross-beams overlapped each other, and each had a cut-away cavity at the point of crossing, which kept it in position, precisely on the principle on which the Swiss châlets are constructed at the present day. The walls of the submerged compartments contained some four or five of these transverses, and the space enclosed varied from 7 to 30 feet long. In the larger spaces the uprights were not restricted to the corners, but occupied intermediate positions inside the enclosed area. Numerous tenons, mortises, pegs, and other portions of worked timbers, proved that these structures were erected by the hatchet and chisel alone, as none showed any evidence of the use of the saw; nor were there any iron nails found.

The woodwork was so abundant, that the removal of it became a regular employment; and for its discovery the mud was probed with iron rods.

In two places a double row of piles stretched to the shore, one 230 feet and the other 130 feet long, which, there can be little doubt, were the remains of gangways.

The industrial relics (**Fig. 93**) consisted largely of iron objects, among which were several knives (No. 3), an axe (No. 11), an awl, a gimlet, part of a pair of shears (No. 2), a chisel, part of a lock (No. 8), chains (No. 7), several keys (No. 9), horseshoes (Nos. 5 and 6), a curry-comb (No. 10), a spur (No. 12), a lance (No. 4), and portions of a javelin.

Of other materials there were two bone-counters (Nos. 14 and 15), a sharpening stone, the half of a leaden bracelet (No. 1),

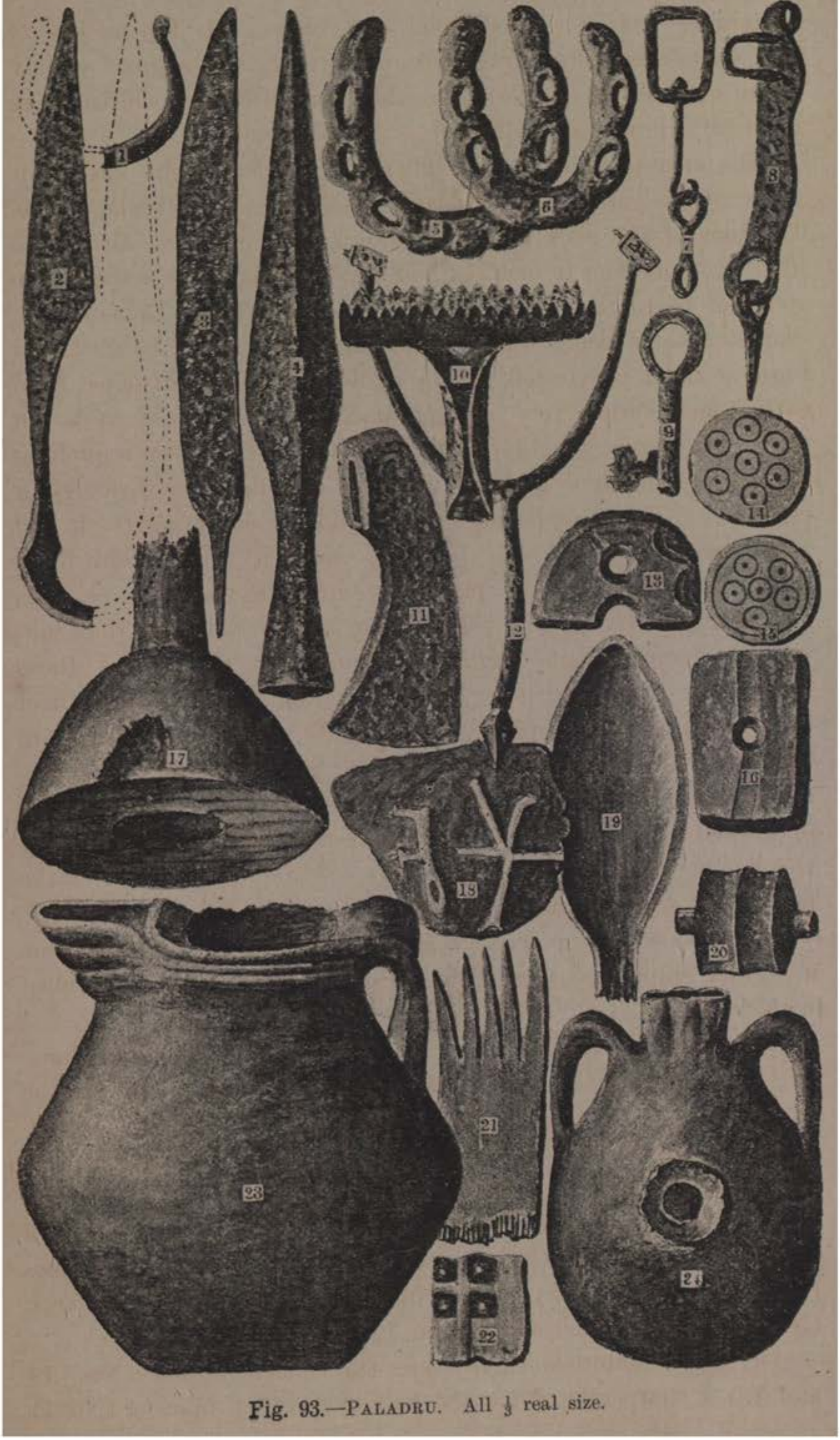
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Fig. 93.—Paladru. All ⅓ real size.

and a number of wooden objects, viz. two combs (No. 21), spoons (No. 19), pestles (No. 17), a bobbin (No. 20), and some perforated bits, like floats for nets (Nos. 13 and 16).

Pottery is of a greyish-black colour, well baked, and fashioned on the wheel, with an ornamentation of a very unusual character (Nos. 18, 22, 23, and 24). The only entire vessel was flask-shaped, having a hole in the middle of one of its sides (No. 24). Some pieces of cloth like Roman tissues, and a portion of a Roman vase, were also found.

The animals identified from the bones were the ox, sheep, goat, horse (a small race), pig, dog, and a large-sized otter. Among the remains of fruits were two species of cherry, two species of plums, peaches, walnuts, hazel-nuts, acorns, etc.

Oak was the only wood used in the construction of the submerged foundations, with the exception of one trunk of a chestnut tree; but ash, cornel-cherry, and box had been used for making utensils. (B. 193.)

In 1885, owing to the lowness of the water in the lake, further discoveries were made on this station (Grands Roseaux). Immediately in front of the lacustrine village, on its lake side, a triple row of piles was detected, which appeared to have acted as a breakwater; and on its site, along with some great oak-beams, were found various relics of a similar character to those already described. Among these were the following iron objects of the Carlovingian period—viz. 17 knives, 2 keys, a hook, a pair of shears, a stirrup, 2 spurs, a portion of the umbo of a shield, and some horseshoes of a small size. The other objects recorded were two portions of wooden spoons, fragments of a comb made of yew, and a piece of goat-skin.*

RHINE DISTRICT.

In the two lacustrine stations just described we had to deal with remains essentially different from any that have hitherto come under our notice. In La Tène both stone and bronze objects are quite the exception, while those of iron are not only in great abundance, but, from their variety and style of art, clearly show that the working and forging of this metal had reached a great state of perfection. In short, we have inherent evidence that the civilisation of the Bronze Age was now superseded by one of a totally different character, and yet it would seem that this complete change had been accomplished independent of, and prior to, the advent of the Romans. On the other hand, the class of antiquities found in Lake Paladru brings us down to Carlovingian times, probably as late as the ninth or tenth century. In pursuing our investigations northwards we find records of many lake-dwellings which, like these, are the products of later ages than those in which the Swiss Pfahlbauten flourished. But, at the same time, there is satisfactory evidence as regards others in the same localities that they belonged to the Prehistoric Ages. Professor Virchow (B. 165) considers that, with one or two exceptions, all the lake-dwellings of North Germany were founded during the Iron Age, and, like our Scottish and Irish crannogs, continued down to the Middle Ages. As regards many, however, no conclusive inferences can be drawn, as they are imperfectly or entirely unexplored.

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* *Association Française pour l'avancement des Sciences*, 1885, vol. i. p. 175.

THE PALATINATE.

Mr. C. Mehlis (B. 400) states that in the low-lying land near Billigheim, on the left bank of the Rhine, evidences of a pile-dwelling have for many years been observed. In one place piles were found in their original position. They consisted of square-cut oak beams, about six feet long, and placed in the form of a rectangle. Near them were collected in great numbers tiles of a dark-red colour, fragments of pottery peculiar to the period from the tenth to the thirteenth century, and bones of the deer. In addition to these relics, which point to the early Middle Ages, there were others at a greater depth which no less conclusively point to a much earlier period. These are described as implements of stone and flint, such as knives, axes, spear-heads, etc.

Other indications were noticed in the turf-beds at Landstuhl and Durkheim; and below Mayence, Lindenschmit has shown that a pile-dwelling existed in Roman times. Other stations are said to be at Würzburg, Wiesentheid, and Niedissigheim, in which the bones of various oxen and pigs were found associated with piles. (400a, p. 254.)

DEÛLE-À-HOUPLIN.

In 1876 M. Rigaux announced the existence of a pile-dwelling in the marsh of Deûle-à-Houplin, in the Département du Nord, in which were found not only broken bones, flint objects chipped and polished, and pottery, but also some metal objects.*

MAESTRICHT (HOLLAND).

In the valley of the Meuse, near Maestricht, Mr. Ubaghs (B. 413 describes a sort of artificial island composed of trunks of trees brushwood, leaves, etc., which came to light in 1883 in the course of railway excavations. This curious structure lies close to the canal from Maestricht to Bois-le-Duc; and it appears that when this canal, many years ago, was being constructed, it is recorded that the workmen had come upon much wood and bones, which were thrown away as of no importance. The portion now exposed by the railway excavations was about 16 feet below the surface and extended parallel to the canal for about 50 yards, with a breadth of 11 yards, and Mr. Ubaghs estimates that 4 or 5 yards more were destroyed by the canal operations. The trunks were from 6 to 13 feet long and, in some instances, 1 foot in diameter. The larger ones were underneath and reposed on a bed of gravel, in which they were partially embedded. Above the beams were decayed branches and leaves, forming a bed of vegetable *débris* some eight or nine inches in thickness, but no upright piles were anywhere observed. Mr. Ubaghs considers this was in former times an island constructed partly, at least, artificially, like the Irish crannogs or the Pfahlbauten at Schussenried, and that it served as a dwelling-place for hunters, who left the remains of feasts and broken weapons behind them.

Among the objects of archæological value collected were the following:—Portion of a human skull, and various bones of the horse, urus, ox, stag, goat, dog, pig, beaver, and the humerus of a bird. The industrial relics consisted of various kinds of implements and weapons of bone and staghorn, as harpoons, perforated clubs, daggers, etc., of which a few are here represented (**Fig. 94**). As these illustrations are merely copied from Ubaghs' work, and are not drawn to scale, I give the respective lengths of the objects, viz. (1) 15½, (2) 10, (3) 6½, (4) 13½, (5) 4¾, (6) 3, and (7) 3½ inches.

No complete skeleton of any animal was found, because, as Mr. Ubaghs remarks, these hunters only carried certain portions of the dead animals to their abodes. It was also observed that the spongy portions of the bones had been gnawed away, probably by dogs.

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* *Matériaux, etc.*, vol. xi. p. 95.

To the portion of the human skull *(dolicho-cephalic)* there is now more than ordinary interest attached, as it was near the same spot that Professor Crahay discovered the celebrated human jaw known as the "Smeermaas mâchoire," and subsequently described by Sir Charles Lyell in his "Antiquity of Man" as coeval with a mammoth tusk found in the vicinity. The present skull was found 11 to 13 feet below the surface, lying upon the gravel bed on which the wooden structures reposed. From a careful comparison of it with the "Crahay jaw," now in the cabinet of anatomy in the University of Leyden, Mr. Ubaghs found that the two relics were identical as to patina, consistency of bone, and the composition of the material in which they were embedded (traces of which still adhered to them), and he comes to the prosaic conclusion that the two belonged to the Maestricht crannog: "Cette mâchoire, ainsi que les autres ossements de la même provenance, ont appartenu à notre station lacustre près de Maestricht."

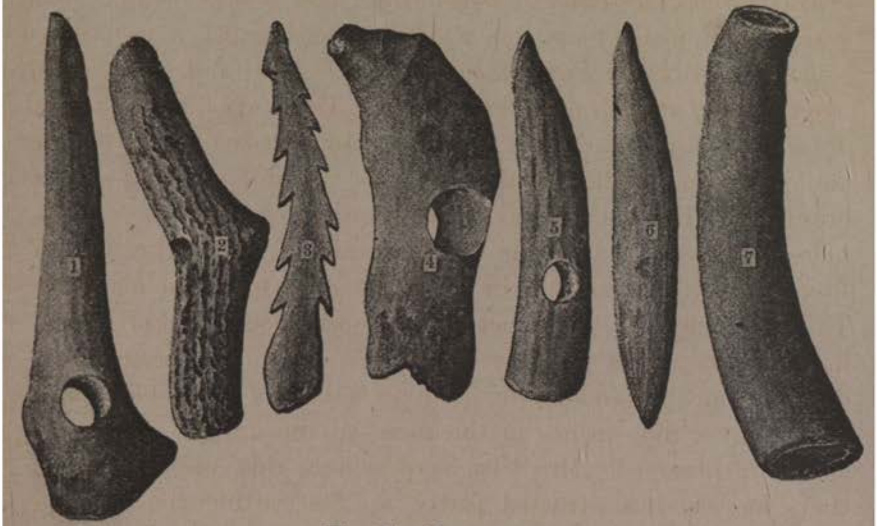

Fig. 94.—MAESTRICHT.

M. Kerkhoffs* attacks Sir Charles Lyell for some palpable mistakes he has made regarding the relative positions of the

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* *Bul. Soc. Anth.*, 1884. (See also "Crannia Ethnica": "Les Préhistoriques" (Mortillet); *Bul. Soc. Anth.*, 1874, 22nd Jan.

Crahay jaw and the mammoth tusk. According to Sir Charles, the tusk was found "six yards removed from the human jaw, in horizontal distance." * M. Kerkhoffs gives the following quotation from Crahay's original notice of the discovery:—"Dans une pointe que forme le plateau de Kaberg, en s'avançant dans la plaine, près de Smeermaas, on a rencontré dans la terre argileuse à 6m50 au-dessous du sol, la mâchoire inférieure d'un homme garnie de ses dents, sans être accompagnée d'aucun autre reste; elle ne semblait pas avoir roulé; les ouvriers assurent que la terre n'y avait pas été remuée. L'os est très fragile, mais n'a pas été dans cet état de mollesse des ossements d'éléphants; aussi n'est-ce pas la même couche de terre; car au-dessous de cette mâchoire s'étendait une couche irregulière de gravier et de cailloux de 2 à 3 mètres d'épaisseur, au-dessous de laquelle était placée une nouvelle couche argileuse dans laquelle on a trouvé des restes d'éléphants à 14 mètres au-dessous du sol."

From these remarks it would appear that Sir Charles Lyell's account of the position of the *mâchoire* is neither a fact nor in accordance with Professor Crahay's description of the conditions in which it was found, as the tusk is here described as having been over 24 feet deeper.†

NORTH GERMANY.—(A) MECKLENBURG.

LATTMOOR.—The discovery of lake-dwellings in North Germany dates back to the summer of 1863, when Dr. Lisch, Curator of the Antiquarian Museum at Schwerin, accompanied one Sergeant Büsch to inspect a peat bog at a place called Gägelow, in the vicinity of Wismar, where the latter reported that some stone implements had been found. Dr. Lisch recognised in this place the site of a lake-dwelling and looked upon the discovery as one of great importance. Soon afterwards Büsch, who was a member of the Antiquarian Society of Schwerin, and took an active part in collecting objects for the museum, ascertained that similar remains were often met with in the peat bog known as the Lattmoor, situated about a mile to the north of the town of Wismar. On the 4th July, 1864, Büsch so greatly astonished the members of the society with the number and variety of objects he placed before them that Dr. Lisch again accompanied him to this new field of discovery, and again came to the conclusion that it was the site of a true Pfahlbau. Sergeant Büsch, to whom the credit of these discoveries was undoubtedly due, became greatly elated over his successes, and continued to supply Dr. Lisch with the most extraordinary objects from this lake-dwelling, all of which were accepted without exciting the slightest suspicion that any of them had been falsified. In 1865 Dr. Lisch published an illustrated report of the Wismar lake-dwellings (B. 100), and the subject attracted much attention in archæological circles on account of their analogy to those in Switzerland. Shortly after the appearance of Lisch's work Dr. Lindenschmit, of Mayence, announced that certain objects included in a small collection which Büsch had sent to him were falsifications, and especially pointed out a bone comb and some other bone objects which undoubtedly came under this category. The doubts thus cast on the relics from the Wismar lake-dwelling became intensified when soon afterwards Büsch got into trouble in regard to some money matters, which ended in his being convicted and punished for forgery. Not only was there now doubt cast upon the genuineness of the entire relics, so much prized at the Schwerin Museum, but the very existence of the lake-dwelling was called in question. After this untoward event Dr. Lisch became more cautious and carefully inspected all the relics that had already come to the museum, the result of which was that Büsch had not only fabricated a considerable number, but also included real objects of antiquity found elsewhere as coming from the lake-dwelling. All the doubtful specimens were then carefully eliminated from the collection, and further investigations were undertaken by competent and trustworthy men, notably Messrs. Fromm and Mann of Wismar. The result of this inquiry was such as to leave no doubt whatever as to the genuineness of the Wismar lake-dwelling, as the same class of objects continued to be found after the disappearance of the unfortunate Büsch altogether from the scene. A couple of years later Dr. Lisch published a second report of the Wismar Pfahlbauten (B. 142), in which he notes those articles he considered to have been forgeries, chiefly objects of bone and horn, in his previous report, and incorporates the further discoveries.

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* "Antiquity of Man," 4th edition, p. 241.

† In a footnote on page 241 of his "Antiquity of Man," Sir Charles states that the Memoir of Professor Crahay was published, in 1836, in the *Bulletin de l'Académie Royale de Belgique*, tome iii. p. 43. I find, however, that in this reference Crahay merely notices in a few lines the finding of the bones of the elephant in the excavations above referred to, and makes no mention whatever of the human jaw.

Since 1867 little peat-cutting has been carried on in this part of the moor, and the antiquities have correspondingly decreased. A final report of this lake-dwelling was, however, given in 1873, by Dr. Lisch, which in every respect confirms its previous character. (B. 242.) Professor Virchow, who also visited the locality and, with his usual critical acumen, investigated the whole matter, came to the conclusion that, notwithstanding Büsch's incomprehensible mystifications, the lake-dwelling at Wismar was undoubtedly trustworthy. (B. 165.)

I visited the Museum of Schwerin during the summer of 1888 for the express purpose of seeing these remains, and after a careful inspection of them I could not differ from the conclusions arrived at by Lisch and Virchow. Moreover, I had the assurance of Miss Buchheim, custodian of the antiquarian department, that there could be no doubt at all that the entire collection from Wismar now in the museum was as genuine as anything of the kind in Europe.

The lake-dwelling remains occupy a separate compartment in one of the wall-cases. Among those from Wismar are 32 flint hatchets and chisels more or less perfect (**Fig. 95**, No. 6), three perforated stone axe-heads (Nos. 16 and 17), eight semilunar flint saws (Nos. 11 and 12), one or two arrow-points (No. 20), a flint dagger with handle (No. 10), some flint flakes and a number of polishers (No. 18). Of horn and bone there are many worked portions, among which are three perforated implements (No. 14), one perforated bead of amber, portions of piles and worked wood, and a large heap of bones. But, of course, all the objects have not come to this museum, as there are some described in Dr. Lisch's reports which have evidently found a resting-place in some other collections. Among the relics are not only large hollow polishing-stones and round rubbers, but also fragments of true querns or handmills, the presence of which appeared to have astonished Dr. Lisch, as he considered the latter to be of much later date than any of the other associated objects.

Of bronze only one socketed celt with side loop and portion of an arm band are mentioned.

The pottery was of a peculiar character, much broken and difficult to make out. One portion, which is here represented (No. 9), shows groups of lines running up and down the bulge of the vessel. A few clay spindle-whorls were also found.

Among the osseous remains Professor Rütimeyer identified the

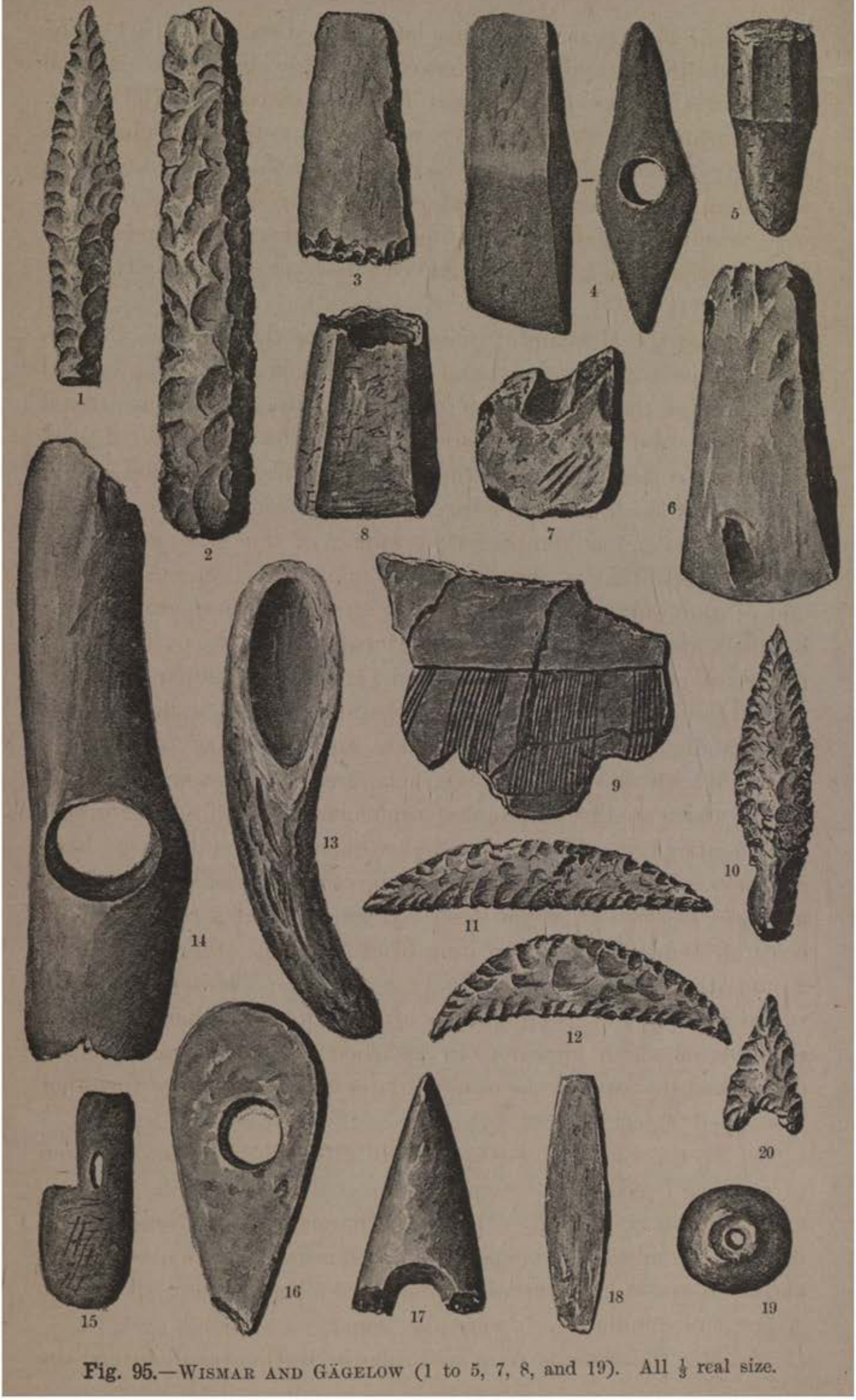
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Fig. 95.—Wismar and Gägelow (1 to 5, 7, 8, and 19). All ⅓ real size.

following animals:—ox (*Bos taurus* and *primigenius*), sheep, goat, pig (*Sus scrofa ferus* and *domesticus*), stag, roe, horse, dog, beaver, rat, wild duck, seal, tortoise, and pike. A few human bones were also collected.

The site of this lake-dwelling is in the low ground known as the Lattmoor, a short distance to the north of the town of Wismar. Judging from the nature of the locality and its surroundings, all authorities are agreed that in prehistoric times it was the bed of an irregularly shaped lake, but of no great depth. The piles were found by the peat-cutters in a somewhat contracted portion some 260 yards to the south of the Muggenburg tile works. On excavating into the accumulated deposits of this basin the following layers were encountered:—(1) ordinary turf, about 5 feet; (2) a layer of alluvial mould, about 1 foot thick; (3) black muddy stuff, containing the remains of water plants for a depth of 10 feet. It was in the latter that rotten piles were detected, which penetrated its whole depth to the underlying glacial clay. These piles were about 10 feet long and 6 or 7 inches thick; and they were placed about 2 feet apart, with their present tops at least 6 feet below the surface of the bog. From the arrangement of the woodwork Dr. Lisch formed the opinion that the huts erected over them were both round and square, and he thought he recognised three of the former and two of the latter. The round huts had a diameter of 14 to 18 feet, and were placed at intervals of 6 to 8 feet. Horizontal beams were found both on the supposed sites of these huts and in the intervals. Leading from one of the huts to the shore there was a line of seven or eight large granite stones.

GÄGELOW.—The site of the Gägelow lake-dwelling, the first discovered in North Germany, is a small hollow near the seashore a few miles to the west of Wismar. This hollow contained a rich deposit of mould, which Herr Seidenschnur, the proprietor, was in the habit of utilising as manure for his fields. It appears that as early as 1861 some horn objects were found in the stuff taken out of this place, which, on being presented to the Museum at Schwerin, then led Dr. Lisch to make the suggestion of a lake-dwelling—a suggestion which was afterwards confirmed by his visit to the place in May, 1863.

By the removal of the mould from year to year, this hollow had been partially converted into its pristine aqueous condition, which, however, could hardly be dignified by the name of a lake, being nothing more than a pond, some 40 yards long by 30 broad. Here a semicircular area containing oak piles was detected, which measured about 22 feet in diameter. The piles were 7 to 10 feet long, and 7 to 8 inches thick, and interspersed among them were some horizontal beams. Associated with this wooden structure were found various kinds of antiquities—viz. four polished or chipped axes of flint (**Fig. 95**, Nos. 2 and 3), two perforated axe-hammer heads of diorite (No. 4), a portion of a third (No. 7), and some flint daggers (No. 1) and flakes. A four-cornered mortar of grey basalt, 3½ inches high by 2½ broad (No. 8); the corners of this vessel are rounded, and its surface neatly polished. A hand-millstone or quern, 1 foot in diameter and 2½ inches thick, made of porous basalt: this quern had a hole in the centre, with two swallow-tail notches on each side for fixing the handle, and its under surface was worked into a series of narrow grooves, precisely similar to those of Roman and post-Roman times. There were also some spindle-whorls (No. 19), a portion of a clay weight, and fragments of dishes of black and red pottery, some of which had handles. The bones were all of the ordinary domestic animals.

Marine Pile-dwellings.—The spirit of antiquarian research aroused in the neighbourhood by these discoveries, led to the recognition of the remains of marine pile-dwellings (Meerpfahlbauten) in the bay of Wismar. Attention was first directed to this subject by Mr. Mann, who pointed out that for several years past flint hatchets, daggers, and knives, as well as various objects of horn and bone, and even bronze implements, were frequently turned up by the dredging machines used in the harbour. The matter, however, excited no interest among the workmen, and thus many valuable objects were re-deposited in deep water along with the dredged mud. It was reported that some bronze objects had been sold to the smith, Vossech, and melted; while others of stone and horn had been dispersed. It appears also that at a particular place called the Baumhaus piles of oak had been observed. In 1864 the workmen engaged at the dredging machines, having their attention called to the matter, reported the existence of piles at various places in the bay, one of which was between the shore and the little island Wallfisch, and the other close to the island Poel. One peculiar horn object which had been sent to the museum was supposed to have been a *Taschenbügel* or rim for a pouch. (B. 100, p. 101, and vol. xxix. p. 132.)

BÜTZOW.—There was also, according to Dr. Lisch, a lake-dwelling in a turf moor called the "Sühring," near the town of Bützow. Here at a given place near the margin of the moor the peat-cutters were occasionally finding antiquities associated with piles, which, on being sent to the Schwerin Museum, led to the recognition of the true character of the find. Over 60 objects were collected, among which Dr. Lisch enumerates the following:—two round stone rubbers, three semilunar flint saws, a flint celt, a perforated axe-head, a bronze pin three and a half inches long, several objects of horn and bone, a piece of reindeer horn, and shells of hazel-nuts. (B. 142.)

VIMFOU.—Dr. Weichmann-Kadow (B. 142) describes a lacustrine dwelling found in a small lake at Vimfou, near Goldberg. The lake was drained and converted into meadow land in 1865, and in its former bed three localities containing piles had been observed, only one of which, however, was subjected to any examination. This was near the middle of the lake, and the piles, which appeared to have been the foundations of a burnt-down hut, occupied a circular area about 12 feet in diameter. Inside the piled area were bits of burnt wood, charcoal, and some broken pottery and three whole vessels. Some of these vessels were well made and had handles and a style of ornamentation which corresponded with the early Iron Age. The only other remains were a few grinding stones *(Quetschmühle)*, some small round pebbles supposed to have been used as draughtsmen, bits of bone, and the shells of hazel-nuts.

(B) POMERANIA AND CENTRAL PRUSSIA.

RYCK.—Almost contemporary with Lisch's discoveries in the vicinity of Wismar were those by Von Hagenow at the mouth of the river Wick. (B. 97.) Rumours of the discovery of various ancient objects of flint, bronze, and iron, while the bed of the river was being deepened, induced Mr. von Hagenow to investigate the matter. These reported discoveries extended backwards for upwards of twenty years, embracing the years 1839–47–59–62 and '64. It was only in the latter year that it became surmised that the antiquities indicated a lake-dwelling. There was no doubt of the existence of piles, which Von Hagenow unhesitatingly concluded had been used for this purpose; but others thought they were the remains of a bridge. Prof. Virchow, writing in 1869 (B. 165), after examining into all the circumstances, was unable to form an opinion or to decide whether these remains pointed to a bridge or to a lake-dwelling.

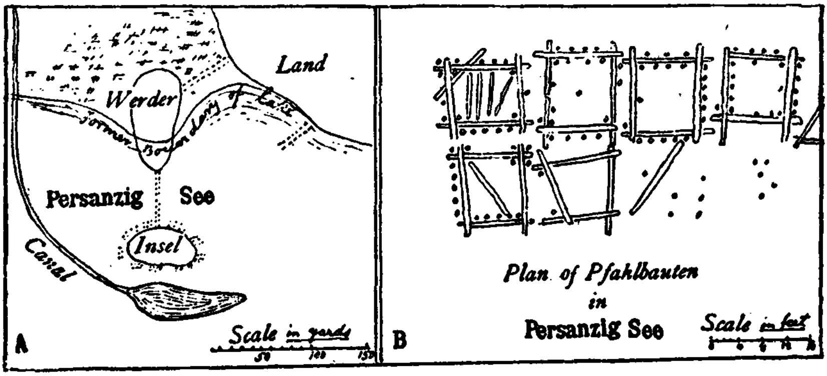
HEGAR LAKE.—This lake is situated in the district of Dramburg, near Sabin, and in it were found many iron objects, upwards of 100 arrow and lance-heads, spurs and horse-bits, associated with the remains of a small wooden house. No objects characteristic of the Stone or Bronze Ages were found, so that there can be no doubt that this station was of a comparatively late age. (B. 119, 2nd ed., p. 629.)

WERBELINSEE. — According to Professor Virchow, this lake contains the remains of a most interesting pile-dwelling. (B. 165.) The lake is situated not far from Joachimsthal and Angermünde, and on its south side, near the village of Altenhof, piles were detected which, by a vague tradition, were supposed to mark the site of a bridge. Professor Virchow, however, by placing long wooden poles in the water where the submerged ancient piles were observed, demonstrated the existence of a vast area which even the sceptical boatmen admitted could only have been intended for the foundations of a village.

PERSANZIGERSEE.—This lake, according to Kasiski (B. 125 and 362), is situated four and a half miles to the west of Neustettin, and formerly covered about 186 acres; but in 1863 it was lowered some 10 feet by the construction of a drainage canal, thereby reducing its area to less than as many roods. At the north end of the lake, and 170 yards from the shore, there appeared a small island, which was found to have been surrounded by a remarkable structure of piles and cross-beams. Sixty yards to the north of this island there was a flat prominence, called the "Werder," which was completely cut off from the mainland, partly by bogs and partly by an arm of the lake 55 yards wide. (See accompanying Sketch Map.)

Stretching between the island and the point of the Werder the stumps of a double row of piles, doubtless the remains of a bridge, were detected. A similar bridge also extended from the Werder to the shore; and to the south of this were the remains of a third bridge, which appears to have never been finished, as it stopped suddenly short after reaching some 40 yards into the lake in the direction of the island. Another row of piles, commencing at the outer end of the bridge which connected the island with the Werder, extended circularly for a considerable distance in the bed of the lake, as if intended to protect the island.

The chief point of interest, however, lay in the peculiar structures which surrounded the island. These consisted of a series of rectangles, some 60 in number, formed of horizontal beams 16 feet long and 8 to 12 inches in diameter; they overlapped each other near their extremities, leaving about 18 inches free, and each beam had deep cuts by which it was kept in position, exactly similar to the plan used in the construction of a log house. The rectangular spaces measured four or five square yards, and had 30 or 40 piles placed on both sides of the chamber-walls, apparently for the purpose of strengthening the horizontal beams, as shown in the plan. These chambers appear to have formed a complete girdle to the island, but they were partly destroyed on the south side. The quantity of wood used was enormous, as the piles alone numbered about 1800. On the north side the structures were remarkably well preserved, being protected by a covering of slime and rushes eight to twelve inches thick. At first Major Kasiski believed that the rectangles were cottages, but subsequently, after comparison with similar structures in other lakes in North Germany, he came to the conclusion that they formed merely the submerged foundations over which the cottages had been built.



The bridges from the Insel to the Werder, and from the Werder to the shore, were built on two rows of piles, 8 feet apart, and the piles in each row were about 7 feet apart. Major Kasiski inferred from the remains of the unfinished bridge, which showed the use of tenons and mortises, that it was of later date than the others.

Among the relics collected on the island or amidst its surrounding structures are two halves of an upper quern, 14½ inches in diameter and 5 inches thick. The under side is concave, and the centre hole, which has a diameter of 1¼ inches, widens upwards like a funnel. Querns have been found in several lake-dwellings in North Germany, as Gägelow, Wismar, and Cottbus, in Neumark.* Other relics consist of wooden clubs, two portions of leather, a skate made of the leg-bone of a horse, staghorn hammers, five sharpening-stones, a few spindle-whorls of stone and clay, a bit of coral, seven portions of worked wood—a shovel, rudder, etc. Of metal there are a fragment of bronze and an iron hatchet. The latter implement is small, measuring only 3½ inches long, and 2½ inches wide at its cutting-edge, and has a round hole for the handle.

The pottery, of which 45 fragments were collected, was made of fine clay, by means of the potter's-wheel, and from the variety of its ornamentation and characteristic wavy lines, there can be no doubt that it belonged to the type of the Burgwälle—an inference which is greatly strengthened by its resemblance to that found in the Wallberg in the Raddatzsee, a noted Burgwall situated in the close vicinity. Illustrations of a few specimens of this pottery are given on **Fig. 96**, Nos. 6 to 9.

From an examination of the bones collected the following animals were identified, viz.:—horse, ox, goat, sheep, pig, dog, fox, deer, and roe.

In the Virchowsee a little to the north of Persanzig there is a huge Burgwall surrounded by water, in which the remains of piles have been found. (B. 165.)

STREITZIGSEE.—On the lowering of this lake a very large assortment of piles became exposed, but although several excavations were made, both by Professor Virchow and others, no decided results were obtained bearing on their character and scope. (B. 165.)

LÜBTOWSEE.—Another locality which has furnished remains of pile-dwellings lies to the right of the Oder, in the vicinity of

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* *Das Ausland*, 1877, p. 960.

Lübtow. (B. 165.) Here the river Plöne traverses a long lake, and on its being lowered in 1859, an extensive area covered with piles became visible towards its northern end. It is said that many relics were found among these piles, some of which were collected by the proprietor; but the idea of their belonging to lake-dwellings was not mooted till several years afterwards. Professor Virchow visited the locality in 1865, and again in 1869, and on the latter occasion he made extensive excavations, which convinced him that this was a regular lake-settlement. Later on the foundations of a quadrangular wooden building came to light, from which, owing to its being 3 feet under the late lake level, Mr. Kühne inferred that the lake must have formerly stood at a lower level. That this structure, however, as well as the piles, belonged to the Iron Age, he says there can be no doubt whatever, as the antiquities collected in both were precisely similar, being generally iron objects, such as swords, lance and arrow-heads, stirrups, spurs, knives, and bricks of the thirteenth or fourteenth century. In the rectangular building, in addition to such objects, were found a helmet and greaves. But what was considered still more singular, there was found among the piles a number of stone chisels and hammers, together with one bronze celt. (B. 119, 2° ed., p. 629.)

Adjacent to this lake at Bonin, and deeply buried in the turf, indications of wooden structures came to light which, in 1872, attracted the attention of Professor Virchow, who, in company with the local antiquaries, made excavations which revealed structures analogous to those in the Persanzigersee. (B. 227.) In excavating they passed through the following distinct layers:—First, 5 to 8 feet of peat; second, some thin layers of marl, sand, and mud; and third, a relic-bed, 2 to 4 feet in thickness. The woodwork appeared to the investigators to have been cut by sharp metal tools. Among the relics collected were four sharpening-stones, a few perforated staghorn hammers, a bone chisel 6½ inches long, some large horn handles, a small iron knife, bits of leather, fragments of wooden dishes, and part of a boat. Pottery was also found which belonged to the Burgwälle type.

SOLDINERSEE.—In 1857 this lake was lowered 7 to 8 feet, when two islands became visible, one of which turned out to be the site of a lake-dwelling, and yielded a considerable number of antiquities, among which was portion of a reindeer horn. (B. 165, p. 407.)

In 1873 Major Kamienski examined it with greater care, and published a short notice of the results. (B. 241.) The island was 150 yards from the shore, and measured 85 by 30 yards. It contained many piles, and showed no evidence of having been destroyed by fire. The relics were of a mixed character. With flint flakes and broken stone-axes were various iron objects, as a hook, a spear-head, three knife-blades, and three halves of horse-shoes. There were also arrow-points of bone, two portions of bows, a clay spindle-whorl, a bone shuttle, beautifully worked, and a piece of horn with a kind of ornamentation cut on it. The fragments of pottery also indicated different kinds. Stones, which looked as if they had been exposed to fire, were supposed to have been used as hearths. Among the osseous remains were those of the ox, pig, stag, roe, fox, bear, beaver, wild boar, and a single vertebra of a fish.

A Burgwall was on the land near the lake-dwelling—a fact which is somewhat significant, as, according to Virchow, there was often a close connection between these two classes of remains.

DABERSEE (HINTER POMMERN).—The Pfahlbauten in this lake were shown by Professor Virchow to be connected with an adjacent Burgwall by a wooden bridge. (B. 165.) He also found that the piles were associated with submerged wooden rectangles similar to those already described in the Persanzigersee. Together with pottery of the Burgwälle type, he found bone skates, an iron hatchet, and an ornamented comb, constructed of several pieces of bone banded together with iron rivets. About this comb he remarks that the teeth were sawn after the pieces were put together—a peculiarity which I have noted of the bone combs found on the Ayrshire crannogs.*

LÜBBINCHENERSEE (KR. GUBEN).—In 1877 a lake-dwelling of the Slavish period (*Spätwendischer und darüber Mittelalterlicher Pfahlbau*) was examined by members of the Märkisches Museum, in Berlin, from which they collected a large quantity of iron objects, pottery, bones, etc., which may now be seen in this museum. The base of this lacustrine dwelling was constructed precisely similar to that at Persanzig, and the beams had similar cuts near their extremities, where they overlapped each other.

ALT FRIESACK (KR. RUPPIN).—A similar Slavish Pfahlbau was found at Alt Friesack, from which there is now in the Märkisches Museum a large quantity of *débris*—wooden beams, quern-stones, some perforated clay sinkers (**Fig. 96,** No. 5), an iron hatchet (No. 2) with traces of ornamentation on it, an iron oblong ring (No. 1), and pottery with the characteristic wavy lines (Nos. 3 and 4).

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* "Ancient Scottish Lake-Dwellings," p. 219.

KLOPPSEE (NEUMARK).—A lake-dwelling in the Kloppsee, near Woldenburg, has yielded a fine black pottery, so well burnt that it gives a metallic ring when struck. The vessels found here are well shaped, and the fragments show handles, feet, and well-formed recurved rims. (B. 165.)

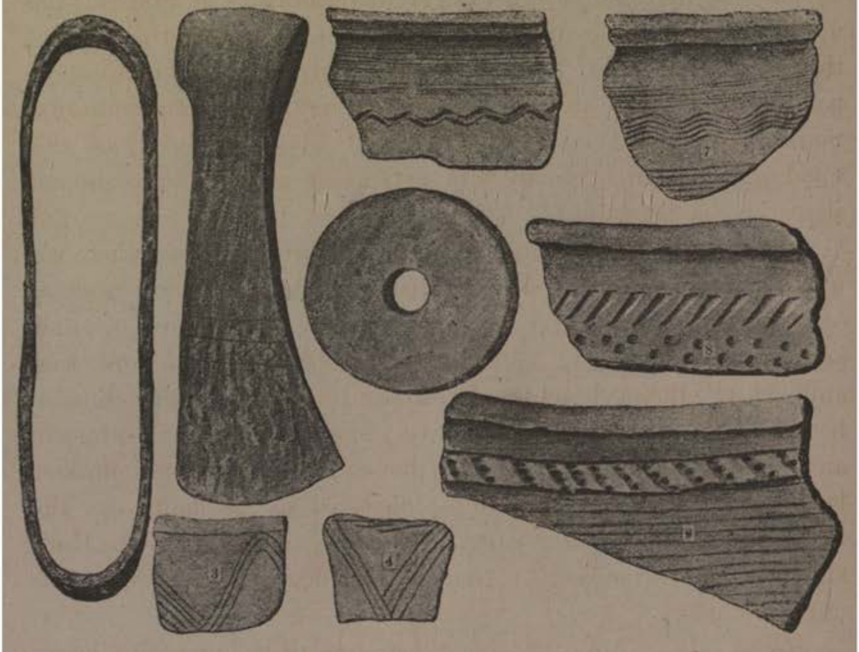

Fig. 96.—FRIESACK (1 to 5) AND PERSANZIG. No. 5 = ¼, the rest ½ real size

SPANDAU.—One of the most remarkable lacustrine discoveries in North Germany was made a few years ago (1881) at the town of Spandau, near Berlin. Here, in a flat space called Stresow, close to the river Havel, in which workmen were excavating the foundations of a military powder-house, oak piles and bronze weapons were turned up from considerable depths.

The locality was almost surrounded by the adjacent sluggish waters, and so wet that two pumps had to be kept going before the men could carry out the necessary excavations. From the sedimentary character of the deposit, as well as the abundance of freshwater shells, there could be no doubt that formerly the place had been occupied by a lake. There was, first of all, a bed of peat about five feet thick, and under this came a deposit of mud and sand. On the south side of the space being excavated there was observed at a depth of nearly 12 feet a layer of greenish stuff, mixed with bones, impregnated with vivianite, and through this layer the piles were found to have penetrated to the sand underneath. It was in the muddy deposit immediately beneath the peat that the tops of the piles appeared, and they were arranged sometimes in parallel rows, and sometimes without any apparent regularity. Some were of oak, and others of soft wood. There was also much timber lying transversely, and many of the beams showed signs of charring.

The relics were collected between and around these piles, and uniformly all over the area. They consisted of a remarkable series of bronze implements and weapons, together with a few of stone and horn. There were also found the bones of tame and wild animals, a human brachycephalic skull and some other human bones, a portion of a canoe, and a very small quantity of pottery of an indeterminate character. The bones were very much broken, but, notwithstanding, they were identified as belonging to the following animals, viz.:—stag, roe, hare, bear, ox, horse, pig, and dog. It is noteworthy that the reindeer and elk were both unrepresented.

Relics.—It is, however, the relics that distinguish this lacustrine find from others in North Germany, and these I shall now describe shortly:—three swords with handles (**Fig. 97,** Nos. 8, 9, and 10), one sword-blade attached by rivets (No. 11); an ornamented *commandostab* (No. 18), and a small button-like object, ornamented with a running scroll of double spiral; three daggers have rivet-marks and one has a tang (Nos. 5, 6, 7, and 12); one dagger, still in its bronze handle (No. 13), has its butt end ornamented with concentric circles and spirals characteristic of the Scandinavian archæological area; two lance-heads with sockets (Nos. 4 and 17), one of which is ornamented with lines and cross-bars (No. 17); one socketed celt (No. 3); five paalstabs (Nos. 1 and 2); and a piece of bronze wire.

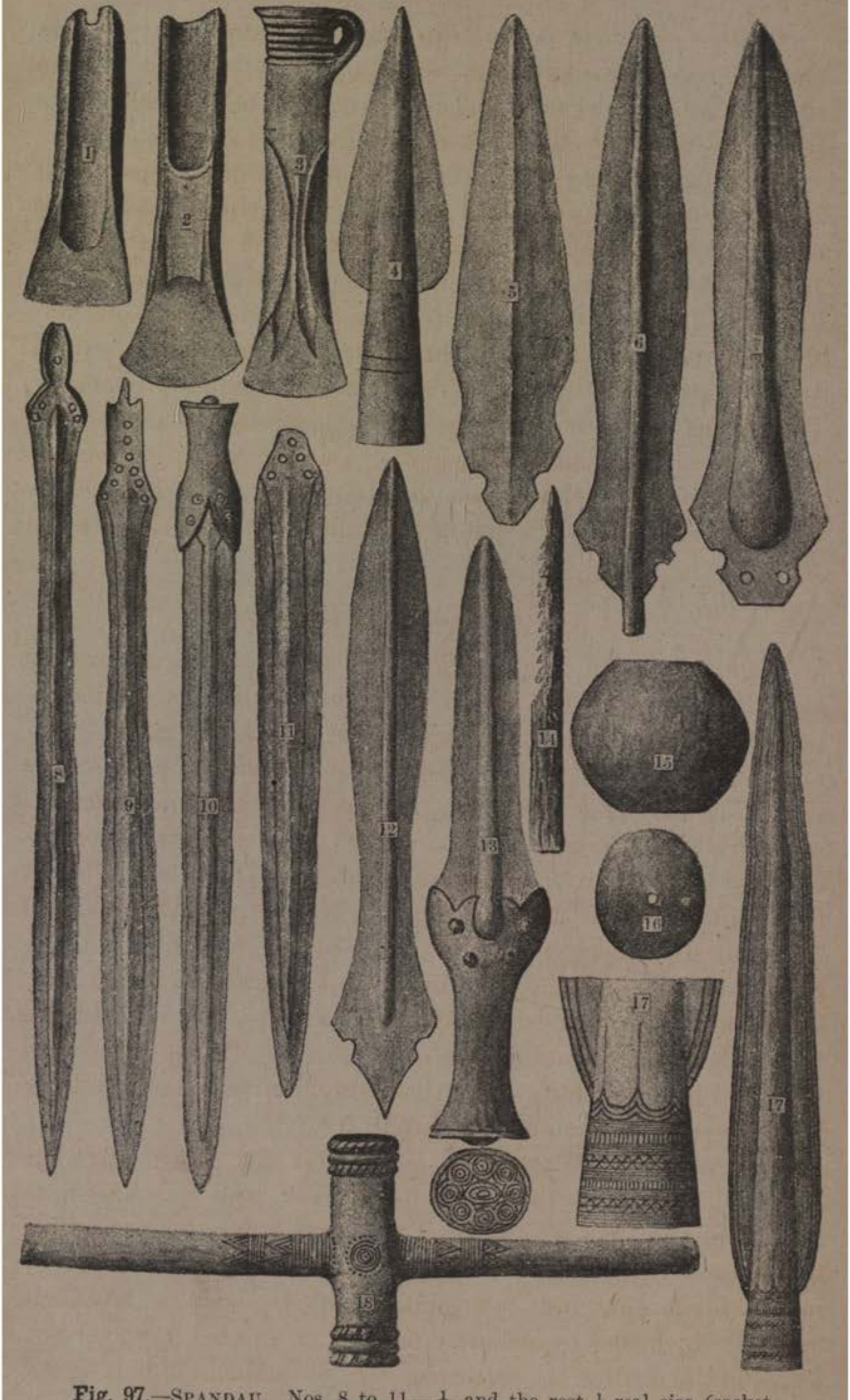
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Fig. 97.—SPANDAU. Nos. 8 to 11 = $\frac{1}{6}$, and the rest $\frac{1}{3}$ real size (socket of No. 17 = $\frac{2}{3}$).

Of stone objects there were two round grindstones or polishers (No. 15) and some sharpening stones, a polished perforated stone (No. 16), a portion of a hammer of greenstone, and a round stone ball 4 inches in diameter, like a cannon-ball.

Five staghorn axe-heads, a disc of horn perforated, a portion of a horn spear, five bits of rough unornamented pottery, and a large perforated ball of clay. Fragments of a canoe showing a length of 10 feet. Report goes that an iron implement, and a portion of a dish like earthenware of the twelfth century, were found; but probably they had no connection with the bronze objects above described. It is noteworthy that all the relics are of a military character, there being among them no spindle-whorls, combs, hair-pins, fibulæ, bracelets, or any other objects that can be said to belong to domestic life. For this reason this lacustrine abode is generally supposed to have been a military fort like La Tène. (B. 384 and 396.)

(c) POSEN AND POLAND.

Objezierze.—In the province of Posen there are several localities to be recorded which have yielded unequivocal indications of lake-dwellings, two of which, viz. Objezierze and Czeszewo, are supposed by local archæologists to date as far back as the Stone Age. The former existed in a swamp now filled up with peat, which has thus preserved and concealed piles and other remains recently brought to light by peat-cutters. The relics collected from this place are now deposited in the Posen Archæological Museum, and among them I have noted the following:—A few remarkably fine knife-flakes of flint, one of which is 7½ inches long, a perforated bead, four large clay rings (**Fig. 98**, No. 8), and three flint celts of the Scandinavian type (No. 7). In the same turf moor and in the vicinity of the lake-dwelling was found a large bronze torque ornamented as shown in No. 9.*

Czeszewo (Kr. Wagrowice).—Although for many years the existence of piles in a particular spot in this lake was known to fishermen, it was not till 1871 that their true nature was recognised by Professor Lepkowsky of Krakow. The lake was surrounded by marshy borders and peat bogs, and at various times its level was lowered, which thus considerably reduced its area. Firewood being scarce in the district, the fishermen were in the habit of pulling out

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* *Zeit. für Ethn.*, *Verhand.*, p. 39, vol. viii.

the piles, and in this way the structures were greatly damaged before a competent archæologist saw them. The site of the Pfahlbau was near a large tumulus constructed close to the original lake margin. The area occupied by the piles was in the form of a segment of a circle, the base of which was 250 paces long and its greatest breadth 75. Transverse beams from 10 to 12 feet long were found interspersed among the uprights, which were supposed to have bound the latter together, though neither wedges nails, nor mortises were detected. It was observed that the uprights had their tops charred and that the portions remaining were longer the farther they were placed from the shore, and hence it was supposed that the dwelling had been destroyed by a conflagration.

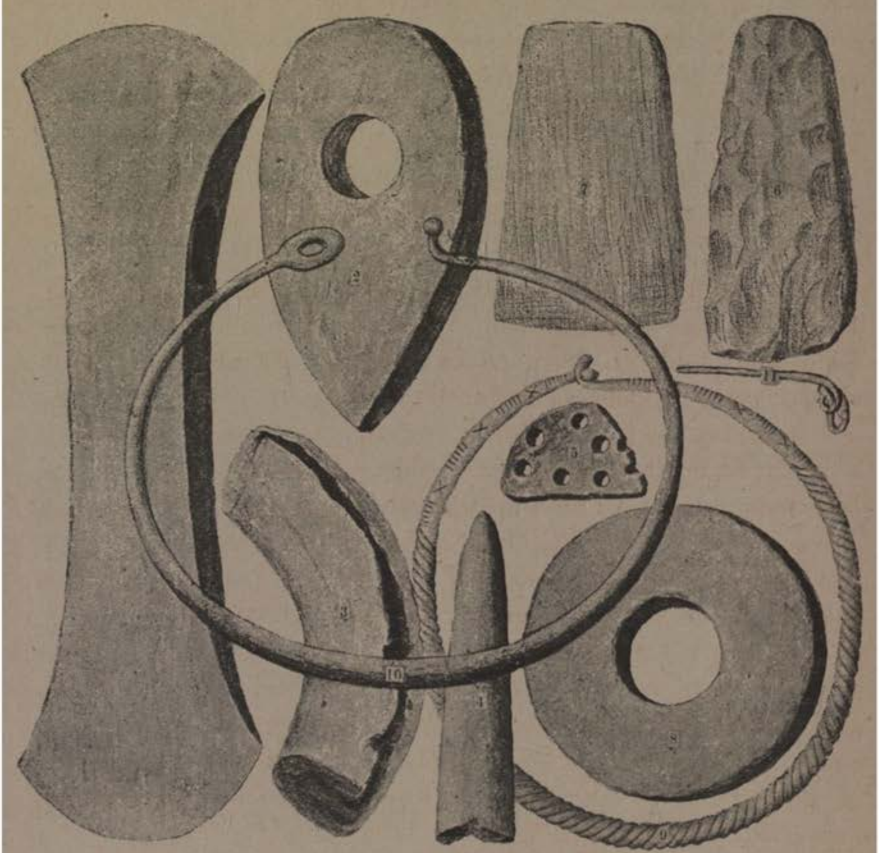

Fig. 98.—Czeszewo (1 to 6), Objezierze (7 to 9), and Lagiewnicki. All ½ real size.

The remains of human industry collected from this station are now deposited partly in the Jagellon Museum at Krakow, and partly in the Archæological Museum at Posen. Among them are fragments of pottery, one being part of a dish perforated with small holes (**Fig. 98,** No. 5), perforated stone and horn hammers and axes (Nos. 1 and 2), one or two plain celts (No. 6), some fragments of clay rings (No. 3), two fragments of human skulls, and a large quantity of the osseous remains of different animals. One object of bronze is said to have been found on this station, and one of the stone implements is only partially perforated, the operation having been unfinished. The stone objects are made of dark granite.

Messrs. Kohn and Mehlis have published a small photographic view of the objects in the Krakow Museum, but the more interesting ones, though fewer in number, are at Posen, from which the illustrations here shown are taken. Notices of this lake-dwelling have been published by Count Przezdiecki (B. 156 and 195), by Kohn and Mehlis (B. 338), and by Ossowski of Krakow (B. 361)—the last being in Polish and French.

GROSSESEE.—At Alt-Gortzig, in the Grossesee, there was a small island which became visible on the lowering of the lake some 10 feet, around which were found piles and the usual *débris* of a lacustrine dwelling, among which were pottery with parallel and wavy lines, charcoal, and an iron axe-head, together with numerous osseous remains. (B. 228 and 352.)

PAWLOWICE.—Mr. Schwartz, of Posen, describes what he considers to have been a lake-dwelling near Pawlowice. Here, in a turf-moor which had formerly been a lake, he found, at a depth of five feet, bits of clay plaster, hearthstones, fragments of cooking vessels, etc.* Also at Komorowo, in the Bythinersee, indications of lake-dwellings have been found.†

LAGIEWNICKI.—Another interesting locality, discovered a few years ago, is at Lagiewnicki (Posen). Here the tops of oak piles were found at a depth of five feet in the peat, and associated with them were fragments of two kinds of pottery—one rough, like that used in the manufacture of urns, and the other of the Burgwälle type. Among the relics were a wooden mallet, a perforated bone implement, some flint flakes, the pin of a bronze fibula of La Tène type (**Fig. 98,** No. 11), and a silver necklace (No. 10), terminating at one end in a raised button which clasped with an eye at the other when fastened. (B. 430.)

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* *Zeit. für Ethn.*, vol. vi., *Verhand.*, p. 228.

† *Ibid.*, vol. x., *Verhand.*, p. 52.

KWACZALA.—At the request of the Academy of Sciences of Krakow, Mr. Adam Kirkor, curator of the Archæological Museum at Wilna, investigated, in the summer of 1873, a peat-moor near the village of Kwaczala, said to contain pile-dwellings. Mr. Kirkor found beams and piles in several spots pointed out by the proprietor, where the peat-cutters were said to have formerly encountered woodwork. Water came upon his trenches at a depth of three feet. Both upright and transverse beams of oak were found, some being over a yard in circumference and 8½ yards long. The area containing structural remains of woodwork was 70 yards long by 40 broad. The foundation was of horizontal beams, spread out in all directions, which he concluded to have been arranged after some kind of architectural principle. There was a large quantity of rude pottery, some showing linear or punctured ornamentation. Two perforated axe-hammer heads of stone, and about 300 bits of worked flint were collected among the *débris*, as well as some bones of the horse. Altogether, this primitive habitation appears to have been of a peculiar kind. (B. 338.)

BIALKA (LUBLINER KR.).—In the moor of Bialka, formerly covered with water, there is a small island about 100 paces in diameter, on which tradition says there was once an enchanted castle. Professor Joseph Przyborowski, of Warsaw, made some excavations on the island, and found on the surface some tiles and modern implements, which so far confirmed the tradition of the ancient castle; but upon digging he came upon wooden piles at a depth of four feet. His excavations extended some twenty feet long and nine feet wide, and in the whole of this area he found numbers of piles, as well as cross-beams. Associated with these wooden structures there was also a relic-bed, entirely distinct from the superficial layer, on which he found two well-formed flint arrow-heads, a portion of a perforated axe of serpentine, some flint implements, and broken bones of edible animals. If this site were properly investigated the author prognosticated results of considerable scientific value. (B. 338.)

Professor Ossowski, in his "Carte Archéologique" (B. 361), gives the following sites of lake-dwellings, none of which, however, have been carefully investigated:—(1) *Warlubie* (Kr. Swieć).

This is a vast peat deposit from which neolithic implements and staghorn hammers have been extracted from time to time. It was visited by Ossowski in the year 1878, who found some fragments of pottery and charcoal. But these merely strengthened the suspicion that the antiquities were due to Pfahlbauten. (2) Similar indications were found at *Kowalewo*, in the district of Tornú. (3) At *Wabrzeźno*, in the district of Chelmno, there is a small lake, in which were found a primitive vase, a bronze fish-hook, a stone hammer, and an implement of staghorn. (4) *Lankorsz*, district of Lubawa.

(D) EAST PRUSSIA AND LIVLAND.

In the eastern districts of Prussia lake-dwelling remains have been discovered in the following places, which have been more or less investigated and described in various archæological publications, especially in the *Altpreussiche Monatsschrift*:—

ARYSSEE (KR. LÖTZEN).—*A. M.*, vol. iv. p. 667; xii. p. 89; xiv. p. 181. *Zeit. für Ethn.*, vol. xix., *Verhand.*, p. 491.

CZARNISEE (KR. LÖTZEN).—*A. M.*, vol. xiv. p. 181; vol. xv. p. 481.

KOCKSEE (KR. RÖSSEL).—*A. M.*, vol. xxii. p. 169; *Zeit. für Ethn.*, vol. xvi., *Verhand.*, p. 560.

PROBCHENSEE (KR. RÖSSEL).—*A. M.*, vol. xxii. p. 169

QUERTZ (KR. HEILSBERG).—*A. M.*, vol. xxii. p. 169.

BONSLACK (KR. WEHLAU).—*A. M.*, vol. xxii. p. 485.

TULEWOSEE (KR. LYCK).—*A. M.*, vol. v. p. 750.

SZONTAGSEE (KR. LYCK).—*A. M.*, vol. xxiv. p. 488.

KOWNATKENSEE (KR. NIEDENBURG).—*A. M.*, vol. xxiv. pp. 168 and 496.

LONKORRECKERSEE (CULMERLANDE).—*A. M.*, vol. x. p. 579.

GESERICHSEE.—*Phy. Ok. Gesel.*, 1874, *Verhand.*, p. 14.

ARYSSEE. — The existence of the *débris* of a remarkable lake-dwelling in the Aryssee became known in 1863, in consequence of the discontinuance of a mill which had its motive power supplied by the surplus water from this lake, and the subsequent deepening of its outlet, which had the effect of lowering its level about seven feet. Its remains have been investigated and described by various persons, notably Professor Heydeck, of Königsberg, who has made plans and models of its peculiar structure. These, as well as a large collection of relics, are now deposited in the Prussia Museum at Königsberg. It appears to have been a kind of *Packwerk*. There were, first of all, two or three layers of round timbers lying transversely to each other on the bottom of the lake in the form of rectangles, after which their sides only were continued upwards by single beams, laid successively on each side, thus leaving empty spaces above. These horizontal beams were kept in position by numerous uprights, which here and there flanked them on both sides, as well as by deep cuts towards their extremities where they overlapped each other, precisely similar to the plan adopted at Persanzig and elsewhere. This understructure had a thickness of three to four feet, and over it was laid a wooden platform, above which the huts of its inhabitants were constructed. Clay floorings were found over these platforms, with evidences here and there of fire-places. The relics were found both on the platform and in the originally empty spaces, which, of course, were now filled up with *débris*. Upon its first appearance there was a layer of from 1½ to 2 feet of mud over the woodwork, but after its exposure for some time the mud dried and became greatly contracted. The central area of this structure measured 72 by 36 feet, and was surrounded by three rows of piles. A bridge or gangway, also constructed on a triple row of piles, extended to the shore, a distance of about fifty yards.

At first, and for several years after its discovery, no metal objects were found, and hence it was supposed to belong exclusively to the Stone Age; but this is no longer the case, as latterly it has furnished both iron and bronze objects.

Among the relics are the following:—fragments of an iron socketed lance-head 4 inches long, a large bronze button 1¾ inch in diameter, and a portion of cast bronze. Wooden hooks, like those from Robenhausen, and perforated square bits, supposed to have been floats for nets. Fragments of pottery and some whole dishes, the largest being 18 inches high, showing nail and finger marks (**Fig. 99**, No. 11), perforated rims (No. 10), and sometimes handles. A few flakes, arrow-points, and scrapers of flint (Nos. 8 and 9). Fragment of a perforated axe-hammer of diorite and some mealing stones. Six perforated horn axes, the largest 6½ inches long; pointers, pins, two needles, and various other objects of bone (Nos. 1 to 7). Arrow-points of bone are 3 to 4 inches long, and scrapers 1½ to 3½ inches. Portions of roofing thatch of rushes, clay flooring, etc.

CZARNISEE AND TULEWOSEE.—These two lakes are in the vicinity of the Aryssee, and each contained a lake-dwelling similar to that in the latter, both in structure and in the character of its relics. On the station in the Czarnisee were found a blue glass bead; a partially perforated stone axe, 3⅛ inches long, with the core still remaining; and two socketed iron lance-heads.

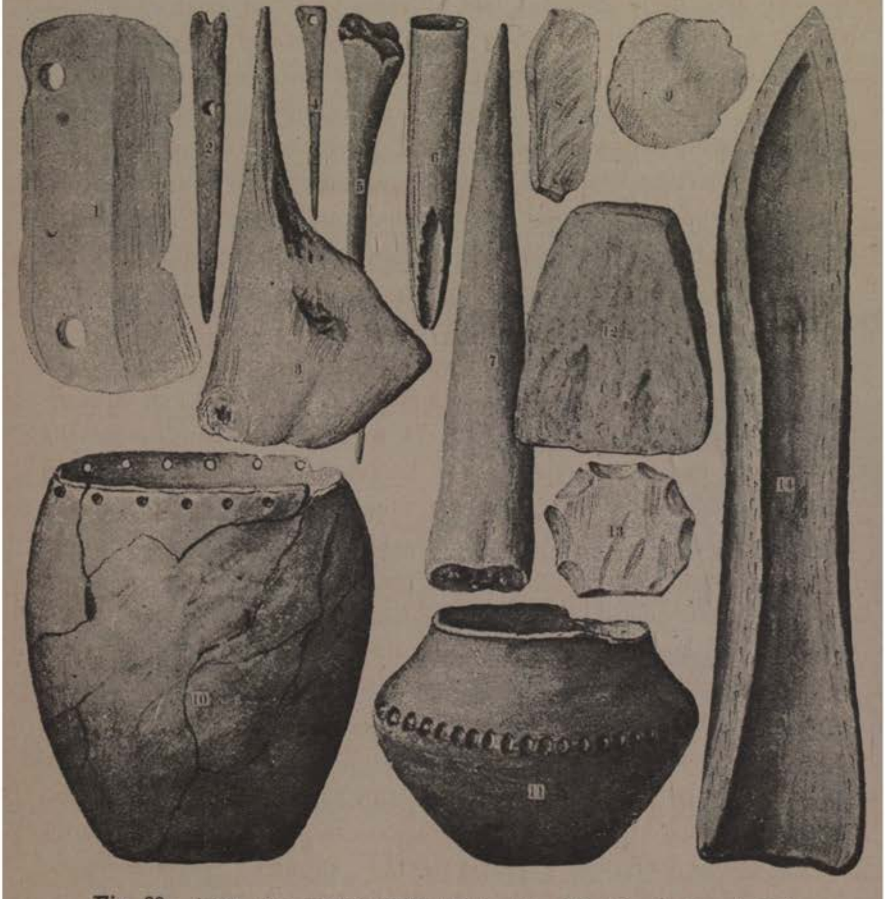

Fig. 99.—ARYS AND KOWNATKEN (12 to 14). No. 10 = ⅛, 11 = ¼, and the rest = ½ real size.

The KOWNATKEN Pfahlbau was also a Packwerk formed of round and split stems. It extended along the margin of the lake for about seventy paces, and had a breadth of twelve at the east end, which became reduced to seven or eight at the west end. Some of the pottery from this station, of which fragments of twelve vessels were found, was ornamented with finger marks as well as string marks (*Schnurornament*). Among the relics are pointers of bone, one supposed to be a skate (**Fig. 99,** No. 14); some round sling-stones; a well-formed stone hatchet (No. 12); worked flint flakes (No. 13); and sharpening stones. Among the bones were those of the stag, roe, pig, horse, ox, and portions of reindeer horn.

The lacustrine dwelling in the KOCKSEE was discovered on the lowering of the lake in the autumn of 1882. When its level had sunk 4½ feet, the structure appeared above the water. It was 34 yards long by 15 broad, and stretched lengthways along the shore, with which it was connected by a bridge. The woodwork appeared to have been cut by metal tools, although none of them have hitherto been discovered in the *débris*. The relics consisted of fragments of pottery and a few stone and bone objects.

In the neighbouring PROBCHENSEE a lake-dwelling, in all respects similar to that in the Kocksee, has recently come to light.

At BONSLACK transverse beams were observed, tied to the uprights by means of birch thongs (*Birkengeflecht*). From this station, some pottery, perforated like a sieve, and a mallet of wood, are recorded.

In the SZONTAGSEE there was also a lake-dwelling of the same class as those above described, the exact details of which have not yet been published. From it there are several interesting objects in the Prussia Museum at Königsberg, among which I have noted bone pointers and spatulæ, a well-formed needle of bone with the eye at one end, and a large bronze button with a raised eye.

As to the other localities in East Prussia where indications of lake-dwellings have been observed, the discoveries hitherto made on their sites are too indefinite to merit a detailed notice here, and I shall content myself with the references already given as to where such observations have been recorded.

ARRASCHSEE (LIVLAND).—In 1876 Count Sievers announced the discovery of a lake-dwelling in the Arraschsee, which was subsequently visited by the indefatigable Professor Virchow. This was a small circular island, covered with birch trees and bushes, which, on examination, turned out to have been an artificially-constructed island, like our own crannogs. Like them, also, it was surrounded by piles, and its interior was constructed of layers of wooden beams laid transversely over each other. Its structure was ascertained by digging two large square holes in different parts of the island, and in one nine layers of wood were counted, and in the other six. The chief relics collected were a bronze ring-pin, seven inches long; a bronze fibula (*eine lettische Fibel*); portion of a mould; a few clay beads; a pointed bone implement; bits of string and rolls of birch-bark; also fragments of grey and black pottery, with rude knobs and finger-marks, and without handles. From marks on the woodwork it was inferred that iron tools were used. The osseous remains belonged to the horse, ox, pig, and beaver. (B. 292.)

GENERAL REMARKS ON THE LAKE-DWELLINGS OF NORTH GERMANY.

Professor Virchow, as early as 1869, published an excellent thesis on the lake-dwellings of North Germany (B. 165), in which he maintained that all of them, with perhaps one or two exceptions, belonged to a much more recent period than those of Switzerland and South Germany. This opinion he founded on the following considerations:—

(1) Though many objects of stone and bronze were found on the former, yet in almost every case they were associated with others of a more recent type, including iron implements, etc.

(2) The food refuse contained most commonly the bones of the ordinary domestic animals, those of wild animals, such as reindeer, wild boar, stag, wild goat, and beaver, being but rarely met with.

(3) Many of the lake-dwellings were synchronous with the Burgwälle, a fact which was conclusively proved by their possessing the characteristic pottery of the latter, as was notably the case in the Persanzig lake-dwelling. Moreover, Virchow showed that some of the Burgwälle had direct communication with adjacent lake-dwellings, as in the Dabersee, Soldinersee, and Kloppsee.

Referring to this subject at a later date (1877), at the eighth Congress of the German Anthropological Society (B. 306), Virchow, while reviewing the further discoveries of lake-dwellings in North Germany, maintained the general correctness of his previous conclusions. These northern Pfahlbauten, according to him, were due to the immigration into the country of the Slavish people, and bear the same relation to the Burgwälle that the pile-dwellings in Italy do to the terremare. "Ich denke," says he, "wir werden uns entschliessen müssen, ganz im Gegensatze zu den süddeutsch-schweizerischen Pfahlbauten, die Einführung der nördlichen Pfahlbauten an die Einwanderung des Slavo-lettischen Stammes anzuknüpfen."

Virchow's opinion is not, however, universally accepted, as many of the local archæologists maintain that there are several lake-dwellings which have yielded relics that can only be explained on the supposition that they were founded during the earlier prehistoric ages. The chief examples relied on in support of their contention are those at Wismar, Spandau, Czeszewo, Objezierze, and Aryssee.

After carefully examining the relics from all these stations I must admit that much could be written on both sides of this controversy. Notwithstanding the number of typical objects of the Stone Age from Wismar and Gägelow, Dr. Lisch records that along with them were portions of querns. Now, querns are never found among the remains of the Swiss lake-dwellings, nor am I aware of their existence in any prehistoric remains in northern or western Europe prior to Roman times. The station at Spandau, if it be considered a true Pfahlbau, was undoubtedly of the Bronze Age. Czeszewo and Objezierze have yielded a considerable quantity of Stone Age relics, with scarcely any of the succeeding ages. Only one bronze object is said to have been found on the former, and from the latter there is in the Museum of Posen a bronze torque (**Fig. 98**, No. 9), which was found at a little distance from the lake-dwelling. As regards the Aryssee and its neighbouring lakes of Czarni and Tulewo, with their respective lake-dwellings, all of which are of the *Packwerk* type, Professor Heydeck relies largely on the presence of pottery with string and finger ornamentation, as a proof of their antiquity, in addition to the ordinary stone celts, horn clubs, etc.; but yet along with them were found iron lance-heads and a blue glass bead (Czarnisee). Similarly in the *Packwerk* in the Kownatkensee, polished stone celts, pottery with finger marks and *Schnurornament*, and portion of a reindeer horn, were found associated with a bone skate, and the osseous remains of the domestic animals, as the horse, pig, ox, etc. In attempting, therefore, to estimate the chronological range of these lake-dwellings from an examination of their contents, which (being unnoticed in the early annals of the country) is the only available means, the mixed character of these relics presents a considerable difficulty—a difficulty which, as we shall afterwards see, is equally applicable to the Scottish and Irish crannogs. But, whatever doubts may be cast on their antiquity and early origin, there can be none as to the comparatively late occupancy of many of them. A bone skate and a comb made of square bits bound together by cross pieces, and showing that the teeth were cut by a saw after the pieces were put together, precisely as may be seen in the combs from the Scottish crannogs and the terp-mounds of Holland, were found by Virchow in the Dabersee Pfahlbau. Iron hatchets (Dabersee, Persanzigsee, and Alt Friesack), horse-shoes, and other iron implements (Soldinersee), pottery of Slavish type (Bonin, Kloppsee, Persanzig, etc.), leather (Bonin), and even armour and bricks of the thirteenth century (Lübtowsee), leave no doubt as to their almost mediæval character.

Reindeer horns were found at Butzow, Soldinersee, and Kownatkensee; but these objects do not necessarily indicate great antiquity, as this animal, though not referred to in the early annals of North Germany, is stated to have been an inhabitant of the country in the time of Cæsar.

The undoubted contemporaneity of many of these lake-dwellings with the Burgwälle opens up a field of research of considerable importance to European archæology; but their exact chronological relationship still remains an obscure problem, owing chiefly to the mystery which surrounds the latter.

(*Burgwälle* or *Rundwälle* is the general name given to the remains of a remarkable class of prehistoric constructions found scattered over the larger portion of middle and north-western Europe, embracing the southern parts of Russia around the shores of the Black Sea, Roumania, Bulgaria, Transylvania, Hungary, Austria, Bohemia, Poland, North Germany, France, Great Britain, and the southern parts of Scandinavia. Their foundations now only remain and these show that the structures were generally circular or oval, but sometimes square and semicircular. They may be divided into three kinds, according to the materials of which their foundations are constructed, viz. :—earth, stones or stones in vitrified condition (*Erd-, Stein- und Schlackenwälle*). Their sizes vary from 20 to 100 paces in diameter, and their height from 10 to 30 feet, and they contained one, two, or sometimes three walls. Those made of earth were circular and generally situated in swampy land, or in countries where stones were not readily accessible. The Steinwälle were in hilly districts and varied in form according to the nature of the ground. Sometimes they assumed the irregular outline of a promontory or peninsula in a lake, at other times, especially when placed on an overhanging cliff, they were mere semicircles. Those of vitrified materials are of special interest to Scottish archæologists owing to the number of vitrified forts in Scotland. They are not very numerous on the Continent, Saxony and Bohemia containing the largest number. In the former country eight are known, viz. :—Schafberg by Löbau, Rothstein by Sohland, Stromberg by Weissenberg, Landeskrone by Görlitz, Brandwall by Blumberg, Koschütz near Dresden, Burgberg by Lichtenberg, and Vorberg by Kirchberg. According to Jelinek, Bohemia is rich in Schlackenwälle, those best known being near Katovic, Bukovec, Litoradic, Hradiste von Hostem, Hradiste bei Strakonic, Hradec bei Domanic Burgberg, Vladar, etc. ("Schutz- und Wehrbauten," p. 102). Instances also occur in Silesia, Thuringian Forest, Rhine district, Brittany, and Normandy.

The Burgwälle, like their analogues in the British Isles, have not yet been systematically investigated. From the character of the relics found in those that have been explored in North Germany they are divided into *Vorslavisch*, *Slavisch* and *Spätslavisch*, a distinction which has been suggested by the unique character of Slavish pottery. These Slavish dishes are always without handles, but of well-burnt pottery, and when ornamented the ornamentation is in wavy lines running parallel to the rim forming the characteristic *Wellenlinie*.

Many of these remains have, of course, now entirely disappeared in the interests of agriculture, but their number still remaining is very great. In Eastern Germany Dr. R. Behla* describes and tabulates no fewer than 1,100. They are more numerous in the fertile districts. In Oberlausitz, in one district measuring 9 miles long by 3 to 16 broad, they number 100, and in the neighbourhood of Bautzen within a one mile circle 20 can be counted.*

It is probable that the material used in the upper structures of the Burgwälle was wood, which, of course, has now completely decayed, except in some special conditions, as in swampy ground where wooden piles were used in their foundations. This is another point of contact between these buildings and the lake-dwellings which has not been overlooked by archæologists. Virchow describes the Burgwall of Potzlow, and that of Zahsow near Cottbus, as constructed over former Pfahlbauten ;† and, indeed, the town of Cottbus seems to have been altogether built over piles, as, wherever diggings have been made, piles are met with, and in this way a finely ornamented quern was found.‡ Wooden substructures, in the form of a platform or *Packwerkbau*, have also been observed and recorded in many places, as at Schlieben, Gross Topola (Posen), the Labenzsee, Westpreussen.* Moreover, those in boggy places were approached by means of wooden gangways, the remains of which have been frequently met with in the form of a double row of piles.†)

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* "Die vorgeschichtlichen Rundwälle in östlichen Deutschland." Berlin, 1888.

† *Zeit. für Eth.*, vol. vi., *Verhand.*, p. 115, and vol. vii., *Verhand.*, p. 127.

‡ *Ibid.*, vol. ix., *Verhand.*, p. 449.

ANCIENT MARINE DWELLINGS ON THE COASTS OF HOLLAND AND WESTERN GERMANY.

Notwithstanding the striking and singular appearance the Swiss lake-dwellings must have presented to foreigners and strangers, it is a remarkable fact that Roman writers are entirely silent about them. Nor can this silence be accounted for on the supposition that the lake-dwellings had entirely come to an end prior to Roman times, as several of them have furnished antiquities whose Roman origin cannot be mistaken. Some archæologists think they recognise in the representation of a Dacian village on the Column of Trajan a true pile-village (B. 164); but this is doubtful, and, even if true, it is but a very meagre evidence of the custom, and leaves the problem of the lake-dwellings as mysterious as ever. Such reticence on the part of classical writers does not, however, extend to the class of ancient remains I am now about to describe.

Pliny very distinctly states that the Chauci (Frisians and other races along the coast of the German Ocean) were in the habit of constructing artificial mounds, on which they built their houses so as to be beyond the influence of the waves and tides. The following passage from his "Natural History" ‡ will be read with interest in relation to the recent discoveries that have been made in the localities referred to.

"I have myself personally witnessed the condition of the Chauci, both the Greater and the Lesser, situate in the regions of the far north. In these climates a vast tract of land, invaded twice each day and night by the overflowing waves of the ocean, opens a question that is eternally proposed to us by Nature, whether these regions are to be looked upon as belonging to the land, or whether as forming a portion of the sea?

"Here a wretched race is found, inhabiting either the more elevated spots of land, or else eminences artificially constructed, and of a height to which they know by experience that the highest tides will never reach. Here they pitch their cabins; and when the waves cover the surrounding country far and wide, like so many mariners on board ship are they; when, again, the tide recedes, their condition is that of so many shipwrecked men, and around their cottages they pursue the fishes as they make their escape with the receding tide. It is not their lot, like the adjoining nations, to keep any flocks for sustenance by their milk, nor even to maintain a warfare with wild beasts, every shrub, even, being banished afar. With the sedge and the rushes of the marsh they make cords, and with these they weave the nets employed in the capture of the fish; they fashion the mud, too, with their hands, and drying it by the help of the winds more than of the sun, cook their food by its aid, and so warm their entrails, frozen as they are by the northern blasts; their only drink, too, is rainwater, which they collect in holes dug at the entrance of their abodes; and yet these nations, if this very day they were vanquished by the Roman people, would exclaim against being reduced to slavery! Be it so, then—Fortune is most kind to many, just when she means to punish them."

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* Behla, "Die vorgeschichtlichen Rundwälle," p. 8.

† *Ibid.*, p. 22.

‡ "Nat. Hist.," lib. xvi. 1.

Notwithstanding the preciseness of Pliny's description and the fact that for several centuries, since the great sea-dykes were erected, the scattered remains of these mounds have been accessible on dry land, they have only quite recently attracted the attention of archæologists. I consider their investigation important, not only for the large amount of industrial remains they contain, but for supplying a missing link in the evidence of continuity in the European habit of constructing pile-dwellings.

TERPEN (WEST FRIESLAND).

Before the construction of the great sea-dykes in Holland nearly the whole of West Friesland would have been in that hybrid condition described by Pliny in which it was difficult to say whether it belonged to sea or land (*dubiumque terræ sit, an pars maris*). At the present time, however, these lands are richly cultivated and look as if they were a dead level. It is only on close inspection that the monotony is relieved by certain elevations of considerable extent called *Terpen*, whose summits rise to about the level of the larger dykes. These mounds are situated at more or less regular intervals, so that if the tides by any calamity had free scope, they would appear as so many islands scattered over the country. It is on such elevations that modern churches and villages are generally built, and, till they accidentally attracted the attention of agriculturists, nobody seemed to think anything about their origin. A few years ago it was discovered that their interior was composed of a rich ammoniacal deposit which agriculturists found valuable as a fertilising agent when spread over their fields. The excavation of this substance for manuring purposes now forms an important industry, and any landed proprietor who happens to own a workable *terp*—*i.e.* one free of buildings—is on the way to realise a small fortune. When a *terp* is found suitable for being excavated they generally commence by digging a canal close up to its base, sufficiently large to admit of the passage of good-sized boats. The boats are then easily loaded with the stuff and so it is conveyed to all parts of the country. As the workings advance the canal is also advanced, so that the boats are always in close proximity to the diggings. In the course of these operations, bones and horns of various animals, pottery, and other relics of human industry, were occasionally turned up.

By degrees these repeated discoveries attracted the attention of antiquaries, and Dr. Pleyte, of Leyden, is now publishing a large illustrated work on the antiquities of Holland (B. 301), in which a conspicuous place is given to the terp-mounds and their contents. It is, however, to some of the office-bearers of the Museum of the Friesch Genootschap at Leeuwarden, more especially Mr. Corbelijn Battaerd, its conservator, that I am indebted for much of my information on the subject. In this museum are stored up most of the objects hitherto found in the terp-mounds, and the collection, already unique of its kind, is daily and rapidly increasing, as orders have been issued in regard to many of them that no relics are to be disposed of without being, in the first place, submitted to the authorities of the museum.

Like most countries, the early traditions of Holland have been forgotten or ignored, and in its annals little mention is made of the *terpen*. In explanation of the origin and early use of the word, Dr. Pleyte quotes from Ocko van Scharl a passage to the effect that one of the ancient kings of Friesland, named

Adgillus, who reigned towards the end of the sixth century, had caused, on account of the ravages of an inundation which took place four years prior to his accession, a large number of elevated places to be formed, so as to give shelter to man and beast in the event of a recurrence of this danger. These mounds were then called *Terpen.*

Mr. Dirks, president of the Friesch Genootschap, as early as 1871 characterised these mounds as analogous to the terramara beds of North Italy ("*ce sont des terramares historiques*");* but it remained to Professor Pigorini of Rome to show that they were identical as regards internal structure. This he did in 1881 (B. 372*c*), after a visit to one at Aalzum which was then being excavated, when he showed that there was a circumscribing dyke, and, although no actual piles were then visible, he was informed by the proprietors that such wooden structures had been occasionally met with. Prior to his visit, it appears that no special attention was directed to these structural remains. From all he could learn, however, on this point, and especially from a consideration of the stratified arrangements of the *débris*, Pigorini concluded that the deposits were due to pile-dwellings, and had accumulated under precisely similar conditions to the terremare, in regard to which he is such a distinguished authority.

The *terp* at Aalzum is still being systematically excavated, and, though only as yet partially cleared off, its results, from an archæological point of view, are now second to none of the kind in Holland. Moreover, the excavations are conducted on an extensive scale, and the locality is readily accessible. I can, therefore, conceive of no better means of conveying to you some knowledge of the nature and structural phenomena of these remarkable deposits, than by detailing the facts which came under my own cognisance during a visit I made this summer to the same spot under the guidance of my excellent friend, Mr. Battaerd.

The *terp* lies about a mile to the north of the town of Dokkum, some twelve miles from Leeuwarden, and four or five from the sea-shore. In approaching the locality from Dokkum there was little to attract special notice beyond the usual Dutch scenery—canals, rich meadows, herds of splendid cattle, and here and there some well-cultivated cornfields. In front of us a slight elevation could be discerned, crowned by a small church in the midst of a clump of trees, the surroundings of which were neatly hedged meadows and cornfields. As we advanced towards this church, and within a few hundred yards of it, we entered on a sloping road, as if raised on a dyke, but on each side the land was perfectly flat and bearing a splendid crop: here a field of magnificent beans, and there an equally promising one of wheat. These fields, said Mr. Battaerd, were formerly part of the *terp*-mound from which the fertilising stuff has already been removed, but this road was left undisturbed, so that we are now actually walking on a portion of its surface. By-and-by we came in sight of heaps of clayey stuff, the tops of which sparkled with reflected light, and in their midst were to be seen the masts and rigging of three boats. Those whitish clay-like heaps, said Mr. Battaerd, formed the surface soil, which, being of no commercial value, had to be wheeled off before the saleable deposits could be got at. At last the actual workings were reached, and we found ourselves in front of a perpendicular section some 15 or 18 feet high, from which men and women were busily engaged in loading the boats. Uppermost in my thoughts was the paramount question of the existence of upright piles, which, it will be remembered, Pigorini had not actually seen. Great was my delight when, at the very first glance, my eye detected an undoubted pile of oak just in face of the cutting. Close by it I soon found another and as we moved along numbers were observed, some soft and yielding, scarcely offering any resistance to the spade; and others of oak very hard in the centre, but more decayed and ragged-like than those I have been in the habit of seeing among the lake-dwelling remains. Those seen in this section differed considerably in size; and I observed that some penetrated deeper than others. At a little distance lay a heap of oak beams which had recently been removed from the trenches—one of which I measured and found it to be four yards in length, and from six to eight inches thick. Upon inquiry, I ascertained that these beams lay horizontally, and about half way down, in the stratified stuff.

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* *Inter. Cong. d'Anthrop. et d'Arch.*, Ses. V., p. 212.

Those who, like Professor Pigorini, are acquainted with the structural features of the terremare of Northern Italy, will not be surprised at the comparative rarity with which piles are met with in the *terpen*, because of the rapidity with which timbers, when buried in dry earth, decay and disappear altogether, leaving in many instances no traces whatever behind them. This fact was strikingly shown by Chierici, who produced positive evidence of the former existence of piles in the upper strata of some of the terremare, by showing that the holes left by the piles, after the woody fibre had completely disappeared by decomposition, had become subsequently filled up by dust and infiltrated material, which ultimately became hardened, and so retained the actual form of the original piles. (See page 248.) In short, natural casts of the original piles were accidentally formed, which thus disclosed a knowledge of their former existence, which otherwise might never have been suspected. To the soundness of this deduction I have myself unconsciously contributed by an observation which I made some years ago, while digging at the crannog of Lochspouts, and having recorded it I may perhaps be allowed here to repeat my words. "One day I was greatly puzzled by finding what was evidently a portion of a birch tree, from 6 to 9 inches in diameter, quite flat, and with scarcely any wood left inside the thick bark. In no instance previously had I seen the evidence of pressure on logs of this size; but after carefully considering the point it was ascertained that such effects occurred only in the upper portion of the mound, and above the log pavement, where the wood had been exposed to atmospheric influences, so that when the woody fibres rotted away the flattening of the bark was easily produced. All the logs found buried in water or mud retained their original dimensions and showed no trace of having yielded to superincumbent pressure." *

The absence of piles and wooden structures from many of these mounds is, therefore, no proof that they have not formerly existed; and, indeed, it is difficult to account for the horizontality and regularity of the beds on any other hypothesis.

While I wandered about amidst the various sections presented by the progressive stages of the excavations, wondering at the distinctness of the strata, or picking up stray objects from the *débris*, such as mussel shells, bits of bone, fragments of pottery, etc., which were to be found here and there sticking in the face of the cuttings, my friend, Mr. Battaerd, was deeply occupied in examining a heap of bones, which lay weathering in a sunny corner. Having joined him in his osteological study, I found that the chief point of attraction was the head of a urus (*Bos*

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* "Ancient Scottish Lake-Dwellings," p. 273.

primigenius) of great size, and with splendid horn cores—the finest example, according to Mr. Battaerd, that had yet found its way to the museum.

The land close to the brink of the section, and extending over a considerable portion of the mound, was occupied by growing corn, and hence its dimensions can only be approximately stated. The proprietors, Messrs. W. and J. Bierma, obligingly accompanied us, and one of them assured me it could not be less than from three to four hundred yards in diameter. Its greatest height above the water in the canal was 18 feet, but of course the level of the canal water is considerably lower than that of high tide in the open sea. The commercially valuable stuff commenced some 3 or 4 feet below the surface, and continued without interruption to within a few feet of the canal water. It was in this intermediate portion that the relics were found: but their exact position, especially that of the smaller objects, was seldom determined, as it was generally after the stuff had become partially broken up during transport that they were found.

The stuff *in situ* was distinctly stratified, forming layers of various thicknesses, from a finger breadth up to 3 or 4 inches, or sometimes more, which in some instances could be continuously traced for long distances. Sometimes they shelved out altogether, and others commenced. Here, a bed of fibrinous matter, in which quantities of the partly decomposed fibres of flax could be readily recognisable; there, a thickish deposit of a brownish glutinous stuff like peat. Charcoal and ashes permeated the whole, and showed themselves sometimes as distinct layers. Clay and sand were also largely mixed with these deposits, and occasionally assumed the form of distinct and separate beds.

Having so far satisfied ourselves as to the structural arrangements of the mound, and the disposition of its contents, we walked up to the church, which is but a short distance from the workings. This small edifice is surrounded by a burying ground, and among the gravestones are some ancient-looking ones. Mr. Battaerd informed me that it dates as far back as the eleventh century.

It is calculated that there are altogether about 150 of these mounds in West Friesland alone, and that of these about the half have been more or less examined, some being now entirely cleared away. They are also to be found in the province of

Gröningen and some other parts of Holland. Dr. Dirks states that the town of Leeuwarden is built over two terp-mounds;* and Dr. Pleyte informed me that he has reason to believe that the town of Leyden also reposes on similar deposits.

Relics (**Fig. 100**).—The relics of human industry collected from the *terpen* are very varied and numerous. Of these the following notes and illustrations, taken chiefly from the large assortment in the Leeuwarden Museum, will serve to convey some general idea of the social economy which prevailed among the occupiers of these singular settlements, as well as of the period in which they flourished.

Prehistoric.—The prehistoric remains, commonly so-called, such as cutting implements of stone, are only feebly represented, but occasionally they do turn up, in which respect the *terpen* resemble the Scottish and Irish crannogs.

Clay Objects.—Perforated loom-weights, both conical and flat; spindle-whorls in great numbers, and often ornamented with finger marks or grooved lines (Nos. 2 and 3). Some flat and triangularly-shaped objects of clay (No. 22) are perforated with three holes, one at each angle, which are sometimes perpendicular and sometimes parallel to the surface; in bulk and composition they correspond with the loom-weights.

Pottery.—Pottery is, as a rule, coarse but abundant, and represents vessels of various shapes and sizes, generally with ears, but a few with handles (Nos. 20 and 23). Samian ware is represented by many fragments of bowls and dishes. A few vases, apparently home-made, have some traces of coloured patches; and there are lids with raised handles and ornamented with hollowed dots.

Bone and Horn.—Bone and horn implements are very abundant, consisting of combs (Nos. 1 and 16 to 19) of varied forms, and constructed of plates riveted together with iron rivets, and ornamented with consecutive circles, lines, dots, and curvilinear figures; among them are also a few combs with very long teeth (No. 30).† There are also pins (Nos. 26 and 28), needles (No. 29), buttons (No. 25), dice (No. 21), finger rings (No. 12), knife handles, pointers,

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* *Cong. Inter. d'Anthrop. et d'Arch.*, Ses. V., 1871, p. 212.

† A comb precisely similar to the one here figured (No. 30) is described and figured by Ossowski as coming from the cavern of Wierzchowska-Górna in Poland. *Antiqua*, 1887, p. 41, and pl. vii. Fig. 10.

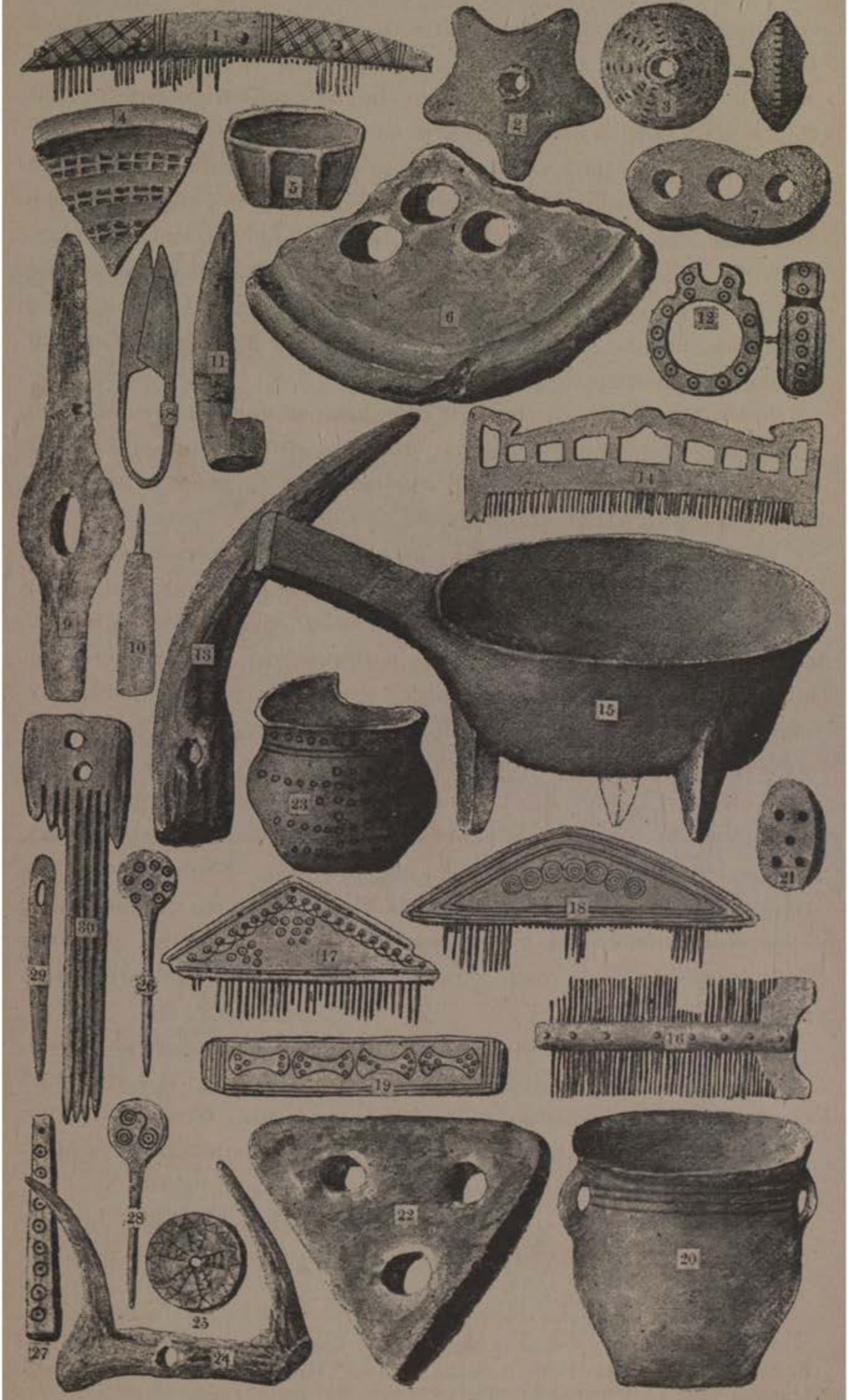
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Fig. 100.—TERPEN. Nos. 24 = $\frac{1}{6}$, 12, 21, 27, and 29 = $\frac{2}{3}$, and the rest = $\frac{1}{3}$ real size.

etc. (Nos. 10, 11, 13 and 27). Many so-called skates made from the long bone of the horse's leg. Two or three short bones (foot of the ox) are covered with concentric circles, apparently for ornamentation. A curious bone object (No. 7) is supposed to have been used in making twine or ropes.

Glass.—Beads, blue, green and variegated; also glass slag.

Metal Objects.—A few bronze dishes (No. 5), one a tripod with projecting handle (No. 15). Figurines of men and animals; the hand of a Roman statue, apparently a female and about full size; Roman fibulæ; some three or four double spirals; a small pair of shears (No. 8), and a few bracelets with clasping-hooks. All these are of bronze. Among objects of iron are shears, hammers, bridle-bits (**Fig. 101**), slag, etc. A leaden bar or pig weighing 17 kilogrammes and marked with three crosses, so, "xxx," was found at Achlum.

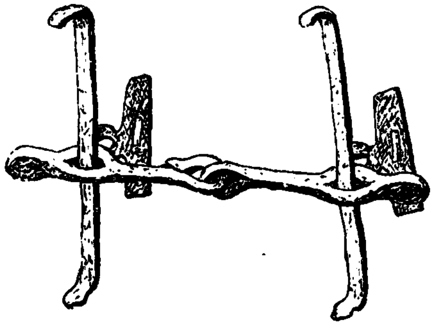

Fig. 101.—TERPEN. Iron Bridle-bit, ¼ real size.

Coins.—Anglo - Saxon coins very abundant: at Hallum 180 *sceattæ* were found in a jar; Byzantine money in gold; Roman imperial money, generally in silver, but sometimes in gold; Frankish coins. The proprietors of Aalzum found a few silver coins in this *terp* with the following inscription: "+ HLOTHARIVS. IMP. DORE STATVS MON (*eta*)," which defines their date to be between 840 and 855 A.D.*

Wooden Objects.—Small spades precisely similar to those used by children while amusing themselves by digging the sand on the seashore. Numbers of large casks the staves of which are kept together by three iron hoops. In diameter these casks are not more than an ordinary herring barrel, but in length they are from six to seven feet, and about one-third from the top there is a small square hole 4 or 5 inches in diameter. The ends of the staves at the top rim of some are much decayed, but the rest is perfectly sound, and for this reason they are supposed to have stood in water with only the upper parts exposed. They have been found in almost all the *terpen* examined, usually at regular distances, and deeply buried. One, 6 feet high, was found resting inside a vat 3 feet deep, and its highest point was over two yards below the surface of the mound. Canoes and small paddles may also be mentioned as occasional relics.

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* *Handelingen van het Friesch Genootschap*, 1886-7, p. 12.

Nondescript Objects.—Cock spurs; egg-shells of the domestic fowl and goose, some of which, singularly enough, were, when found, still unbroken; shells of various kinds of sea-urchins, star-fishes, and mussels; amber beads, also this material in the unworked form; amorphous vivianite; large quantities of the *débris* of flax; one curious object is a flute made of the shank bone of a small animal; one small fictile dish has four feet, and a few others are in the form of three cups attached. At Aalzum, on the occasion of my visit, among the articles purchased by Mr. Battaerd were a mitten and some sort of head-dress like a felt wide-awake. The mitten had only one stall, for the thumb.

In the *terp* called Beetgum there was found an urn, like those from the dolmens of the Drenthe, containing some burnt bones. Human bones are sometimes found, but they are supposed to have belonged to secondary burials. At Aalzum a grave was found containing a body and along with it was a fibula of the Merovingian period, with a flat back containing a beautiful mosaic pattern of variegated glass and amber.

Fauna.—Osseous remains representing the following animals:—Horse, ox (several varieties—*Bos taurus, primigenius, longifrons, brevicornis*), cat, dog, sheep, wild boar, deer, roe, and fallow deer. Among the skulls of these animals (of which there are many) are one or two of the four-horned sheep. It may be of interest to note that the osseous remains of this animal were among those identified by Sir W. R. Wilde as coming from the crannog of Lagore (page 351).

WARFEN (EAST FRIESLAND).

In 1879 Dr. Tergast, of Emden, published a short account of the prehistoric antiquities of East Friesland,* in which he takes notice of the existence of certain mounds, in the low-lying regions, called "Warfen," which he believes to be the remains of very ancient settlements constructed for the protection of their inhabitants against floods and the fluctuations of the surrounding waters.

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* "Die heidnischen Alterthümer Ostfrieslands." Emden, 1879.

The author does not give many details about these mounds. It would appear, however, that they are to be met with in considerable numbers, as he suggests that it would be of the highest interest to archæological science to have a map constructed showing their local distribution. Nor do they appear to have been subjected to much practical investigation, as only three objects from them are illustrated in Dr. Tergast's book. These are a bone implement (so-called skate or cloth-polisher), a necklace of glass and amber beads, and an iron arrow-point. He also figures a comb (six inches long) similar to that from the *terpen* (**Fig. 100,** No. 30), but without specifying the locality where it was found. All these are precisely similar to objects found in the terp-mounds of Holland. Every indication, therefore, points to the conclusion that the *Terpen* and *Warfen* are quite analogous to each other and belong to the same period of time.

WURTHEN (DITHMARSCHEN).

In 1883, Dr. Hartmann, of Marne (B. 397), gave a more detailed account of similar dwellings in the Holstein fen-district, near the embouchure of the river Elbe. These, in the form of low mounds, are met with, according to him, in all the marshes along this part of the North Sea coast. In the Dithmarschen, both north and south, they are very numerous, and the larger ones, like the terp-mounds of Holland, are now generally occupied by one or more modern buildings. In extent they vary from 1¼ to 15 acres, and in height from 13 to 23 feet above ordinary mean tides. On several occasions in recent times, in the course of excavating the foundations of new buildings, the digging of wells, etc., various relics, such as fragments of pottery, clay weights, iron implements, bits of manipulated stag-horns, broken bones, etc., were turned out, which, however, suggested nothing more than passing comments. But their real nature is now clearly pourtrayed by the facts recorded by Dr. Hartmann, the chief of which were ascertained from excavations conducted by himself in the Fahrstedter Wurth situated some three miles to the north of the Elbe. This *Wurth*, some years ago, became the property of a brick manufacturer, of the name of Huesmann, who was in the habit, from time to time, of utilising its contents, partly for filling up old clay-pits and partly for manuring purposes. Such was the condition of the Fahrstedter Wurth when Dr. Hartmann's attention was directed to it in August, 1881. On his first visit, while poking about the open trenches, he picked up, at a depth of four feet from the surface, a perforated clay weight, four inches in diameter, and two and a half inches thick. After this he continued his visits to the locality regularly, and, in a short time, collected a number of relics, besides determining many interesting points in regard to the structure of the mound. The greatest depth reached by the haphazard excavations of Mr. Huesmann was nine and a half feet. Along the exposed section down to this point Dr. Hartmann distinguished the following layers:

1.	Ordinary soil (*Ackererde*)	about 2 feet.
2.	Greenish sandy earth (*hellgrüne sandige Erde*), supposed to be due to sea action, from the fact of its containing many of the spicules or needles of sponges	1 "
3.	A layer of reddish clay (*rother Estrich*)	½ to 1 "
4.	Remains of wooden structures (*Packwerk*)	2 to 4 "
5.	Earth mixed with clay (*helle Kleierde*)	1½ "

This *Packwerk* is described as made up of decomposed branches, from the size of a finger to, occasionally, the thickness of an arm, arranged horizontally, but sometimes perpendicularly. Its lower portion was composed of large quantities of the twigs of birch and oak, the fibres of several marsh plants, broken bones, and other organic *débris*. In the underlying clay he noticed some holes, which he concluded to have been due to small piles, the wood of which had disappeared by decomposition. Scattered through this Packwerk were found, besides charcoal and ashes, a varied assortment of the relics of human industry, of which the following may be noted:—Fragments of pottery, (grey and black), among which were some with perforations round the rims; sharpening-stones; a perforated clay weight; twelve portions of quern stones, made of basalt, and having a thickness of one and a half to two and a half inches—from a fragment, the entire diameter of one was ascertained to be 17 inches; several iron knives, a socketed lance-head, and some nails, together with lumps of both iron and glass slag. A wooden handle, some worked objects of bone with marks of rivets, bits of birch-bark, etc. A black mass of asphalt, supposed to be a product of birch-bark, had embedded in it the shell of a hazel-nut. From this it was inferred that the mass was originally in a fluid condition.

Among the osseous remains the following animals were identified by Dr. Pfeffer, of the Natural History Museum at Hamburg, and Dr. Rautenburg:—dog, ox, pig, sheep, stag, horse, bittern (?), and sturgeon (recognised by its scales).

In the clay below the Packwerk (*Kleierde*) were found the stumps of eight piles, five to six feet apart, which Dr. Hartmann concluded had originally passed upwards through the fascine work, but now only the portions embedded in the clay remained, the rest having disappeared by decomposition. Of these piles (four oak, three birch, and one ash), some were round and some rectangular, and nearly all more or less pointed at the lower extremity. The exceptions were blunt and rested on some fragments of granite stones. One of the piles, which measured six inches broad, and two and three-quarter inches thick, contained four round holes, in one of which a portion of a spar still remained.

Having satisfied himself as to the condition of this portion of the mound already exposed, Dr. Hartmann got permission from the proprietor to sink a shaft into the undisturbed portion underneath. The superficial area of this shaft was 12 feet long and 9 broad, and it was excavated until the sea-sand was reached, at a depth of 11½ feet—*i.e.* about 21 feet from the surface of the mound.

Continuing now our inspection of this section (the upper portion of which I have already detailed) the following layers were successively passed through:—

6.	Clay earth continued	1½ ft.
7.	Packwerk (No. 2)	1 „
8.	Blackish clayey stuff (*dunkle Kleierde*) ...	1 „
9.	Light clay (containing the stumps of a second series of piles, four in number, and from three to five and a half inches thick) ...	1 „
10.	Packwerk (No. 3)	3 „
11.	Whitish clay, mixed with twigs, branches, reeds, etc.	2 „
12.	A layer of cowdung (*Grüngelblicher fester Kuhdünger*)	2 „
13.	Sea sand (*Meeressand*)	

The two *Packwerke* here encountered are stated to be similar to the first, and the relics are also much of the same character. The under portion of both is described as being made up of twigs of oak, birch, and hazel, very much birch-bark, worked bits of wood, wooden handles of tools, burnt faggots, *débris* of marsh plants (*Schilf, Binsen, und Samen von Polygonum*), small bundles of bast and other fibres of fine roots, shells of hazel-nuts, fragments of pottery (six pounds), lumps of iron slag (five pounds), broken bones (sixteen pounds), charcoal, a piece of red-stone, and the shells of some edible molluscs (*Helix fruticum* and *Strigella*, and *Cardium edule*).

Among the relics to be noted are a spindle-whorl, an iron buckle, and a bit of leather.

Of special interest is a third series of piles, which he describes as terminating in the sea-sand underneath all. These piles were five in number, four oak and one birch, 2 to 5½ inches in thickness, and 18 to 33 inches in length. They were placed in a zigzag fashion about 1½ foot apart, and traced through the layer of "Kuhdünger" to the "Packwerk," where they became so rotten as to be no longer recognised. One of them had also a hole, which still retained portion of a projecting spar.

Our investigator made observations, but of a much more limited character, on nine other *Wurthen*, and in all of them he found the "Packwerk" to be a special feature in their structure.

Such is an epitome of the facts on which Dr. Hartmann bases his opinion that not only the *Wurthen*, but also the neighbouring *Warfen* and *Terpen*, were constructed like the fascine islands of prehistoric Switzerland, and the Scottish and Irish crannogs. The idea of pile-buildings can scarcely be entertained by him, and he stoutly combats Pigorini's opinions in regard to the *Terpen* of West Friesland.

The Fahrstedter Wurth, according to Hartmann, consisted of an original mound some seven feet high, to which on two subsequent occasions additions were made. The initiatory process of its construction was to form a basis of *Kuhdünger* two feet in thickness. Over this clay and rubbish were placed, to the extent of other two feet; and then came the fascine structures, which raised the mound other three feet. To keep the mass together, piles were driven here and there down to the sandy bottom. But the inhabitants soon found that this was too low to shelter them from the waves and floods, so they constructed an addition to their mound, which raised its surface to ten feet. But this was not enough, and so a third addition was made, which added six feet more to the mound. At this height its surface would be about twenty feet above the medium sea level (*Normal Null*), and at this height Dr. Hartmann concludes that cottages would be quite secure, as the highest tides on record—viz. 4th February, 1825, reached only 12 feet 4 inches above the medium sea level, a result which would leave a considerable margin for the Fahrstedter Wurth. Of course, the tides never reach it now, as it is protected by the sea-dykes, the first of which was constructed in the middle of the twelfth century.

Very little reflection shows the inherent improbability of Dr. Hartmann's theory. Where could the primitive builders get such a quantity of "Kuhdünger" to start with? If the "Packwerk" was constructed as a solid mass, how could its under portions be so prolific of such varied relics, and other odds and ends of human occupancy? Moreover, the disproportion between the original and final height of the mound is incompatible with the supposition that the successive increases were merely additions entailed by unforeseen circumstances, such as an unusual storm. The three platforms with their corresponding series of upright piles, the stratified assortment of the structural materials, and the position of the relics and *débris* of its inhabitants scattered throughout the entire mound, are, in my opinion, inexplicable on any other hypothesis than that we have here the remains of pile-dwellings, successively erected one above the other, precisely similar to the terremare already described. The more probable *modus operandi* was to construct in the first place a circumscribing dyke of mud, varying in size according to the number of the tribe or family, behind which the cottages were built on platforms supported on piles. When the under spaces became filled up with the accumulated *débris* of men and cattle, and all the other odds and ends of continued occupancy, the process was repeated again and again, until the whole enclosed area, in the course of some centuries, became a flattish mound or island within the limits of the tidal shore.

Fifth Lecture.

THE LAKE-DWELLINGS OF GREAT BRITAIN AND IRELAND.

I.—IRISH CRANNOGS.

PUBLIC attention was first directed to Irish crannogs by Sir W. Wilde, in the year 1839. It appears that early in this year Dr. Petrie's curiosity was roused by the frequency of the visits of a local dealer offering for sale objects of more or less archæological value, which, he stated, were found in a peat bog at Dunshaughlin, in the county of Meath. The articles exhibited were of a miscellaneous character, and their assortment in such a place seemed so strange that Dr. Petrie determined to visit the locality. Accordingly he and Surgeon Wilde (afterwards Sir W. R. Wilde) started for West Meath in search of the mysterious find, and were conducted to the peat-bog of Lagore, near the village of Dunshaughlin. Here, within the boundaries of a drained lake, they found an artificial mound entirely overgrown with peat, then partially exposed by turf-cutters. On making inquiries as to the antecedents of this mound they were informed that it had been well known to bone-collectors for upwards of ten years, and that already 150 cart-loads of bones had been dug out and forwarded to Scotland for manure. Altogether the find was considered of great importance, and it was arranged between the two antiquaries that Petrie should write a description of the antiquities, while Wilde was to confine himself to an analysis of the animal remains.

According to Mr. W. F. Wakeman,* it appears that Dr. Petrie was a little jealous of Surgeon Wilde's enthusiasm for archæology, and accordingly wished to limit the scope of his investigations. Wilde's paper, entitled "On the Animal Remains and Antiquities recently found at Dunshaughlin," was read at a meeting of the Irish Academy on the 27th April, 1840, and it is singular, and perhaps confirmatory of Wakeman's suggestion, that, with the exception of two extracts bearing on the situation and structure of the mound, it is reported in the Proceedings only in abstract. I here quote these extracts as the most authoritative description of this remarkable lake-dwelling now extant :—

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* *Journ. R. H. A. A.*, vol. v., 4th S., p. 325.

LAGORE OR DUNSHAUGHLIN.

"About a mile to the east of the village of Dunshaughlin, on the townland of *Lagore*, and near the margin of a 'cutaway' black bog, is a circular mound, slightly raised above the surrounding plain, its highest central part being about eight feet above the margin, and the circumference of the mound measuring 520 feet. A small stream passes through the circle; and the whole bog in which it is situated occupies a slight concavity of about a mile and a half in circumference, bounded by raised tillage and pasture lands. Within the memory of some of the old inhabitants of the neighbourhood, this bog was covered with water during the greater part of the year, and it is so invariably during winter up to the present period. A large pond is still in existence in one of the fields adjoining the mound. A few years ago some labourers, while clearing the stream-way, discovered several bones protruding from its sides; and in May, 1839, the quantity of bones found in the drain was so great, and their value so well known, that a further examination was made, when it was discovered that the greater part of the mound was composed of the remains of animals, placed there in the following manner :—

"The circumference of the circle was formed by upright posts of black oak, measuring from 6 to 8 feet in height; these were mortised into beams of a similar material, laid flat upon the marl and sand beneath the bog, and nearly 16 feet below the present surface. The upright posts were held together by connecting cross-beams, and fastened by large iron nails; parts of a second upper tier of posts were likewise found, resting on the lower ones. The space thus enclosed was divided into separate compartments, by septa or divisions that intersected one another in different directions; these were also formed of oaken beams in a state of great preservation, but joined together with greater accuracy than the former, and in some cases having their sides grooved or rabbited to admit large panels driven down between them. The interiors of the chambers so formed were filled with bones and black moory earth, and the heap of bones was raised up in some places within a foot of the surface. It was generally found that the remains of each species of animal were placed in separate divisions, with but little intermixture with any other; and the antiquities, etc., were found along with them, without any order or regularity, but for the most part near the bottom." (B. 4, p. 420.)

From the abstract of Wilde's paper I find that among the osseous remains the following animals were represented:—several varieties of oxen, the pig (a smaller variety than is now bred in Ireland), the horse, the ass, the common and fallow deer, the goat, *one skull of the four-horned sheep*, a large species of the greyhound tribe, probably the Irish wolf-dog, and the fox. A few bones of birds, the shells of limpets and buccinums, and a large quantity of the broken shells of hazel-nuts were also noted. Nearly in the centre of the heap, and within 2 feet of the surface, were found two human skeletons lying at length, and without any surrounding wood or stone coffin. Owing to the prejudices of the peasants these bones had to be re-interred. The report then goes on to say:—

"The antiquities found in this place may be divided into the warlike, the culinary, and the ornamental. They consisted of *iron* swords of different lengths, with straight edges and angular points, and bearing a resemblance to the ancient Roman swords. Very many knives were found, of different shapes and sizes, with iron spear, javelin, and dagger blades, and part of the boss or central ornament of a shield; but *no brazen weapons* of any description. Two querns, or ancient corn-mills, were found on the marl, at the bottom of the enclosure; sharpening-stones, iron chains, an iron axe, a brazen pot, and three small brass bowls of most elegant shape and workmanship; several articles precisely resembling miniature frying-pans, of about three inches in diameter (perhaps incense-burners); circular discs of turned bone, wood, and slate, like those supposed to have been used at the end of the distaff; small shears, like the modern sheep-shears; brazen, bone, and iron pins, from 4 to 6 inches in length, the former of great beauty of construction; brooches, and parts of buckles, containing pieces of enamel and mosaic work; bracelets; wooden (yew-tree) combs, toothpicks, etwees, and other articles belonging to the toilet. Several of these articles show an extraordinary state of perfection of the arts at the period of their construction.

"A very curious bone was likewise found (**Fig. 102**), and exhibited to the meeting, with a number of devices carved on it, as if by way of practice in engraving; these devices consisted of scrolls and marks precisely similar to those found on ancient Irish crosses, ornaments, and grave-stones. There were no crosses, beads, or *Christian* sacred ornaments found in the excavation: but a number of pieces of stags' horns sawn across, and also pieces of hazel-wood, in great quantity, as if laid up for firewood, were found in one spot near the bottom. Some of the articles exhibited now belong to the collection of the Dean of St. Patrick's: but the greater number were forwarded for the inspection of the Academy by Mr. Barnwall, of Grennanstown, on whose ground the discovery was made, and to whom Mr. Wilde was indebted for the bones, and permission to make any researches he might require."

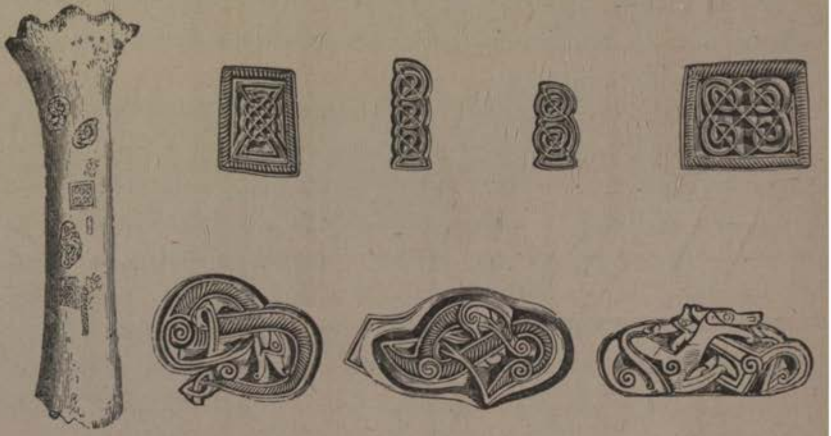

Fig. 102.—LAGORE. Carved Bone, showing some of the designs real size.

The late Lord Talbot de Malahide, writing in the *Archæological Journal* of June, 1849 (B. 10, p. 101), says, in regard to the Lagore find:—

"A great portion of these valuable relics became the property of the late Dr. Dawson, Dean of St. Patrick's; and on his decease were purchased, with the rest of his Irish antiquities, and presented to the Museum of the Royal Irish Academy. Surgeon Wilde also presented to the same institution a valuable collection of the bones found in the same locality. Mr. Barnwall, the owner of the soil, still possesses some remnant of this treasure, after having been plundered to a considerable extent by dishonest servants; and those specimens which I possess, representations of some of which are given in illustration of this paper, I owe to the liberality and kindness of the same gentleman."

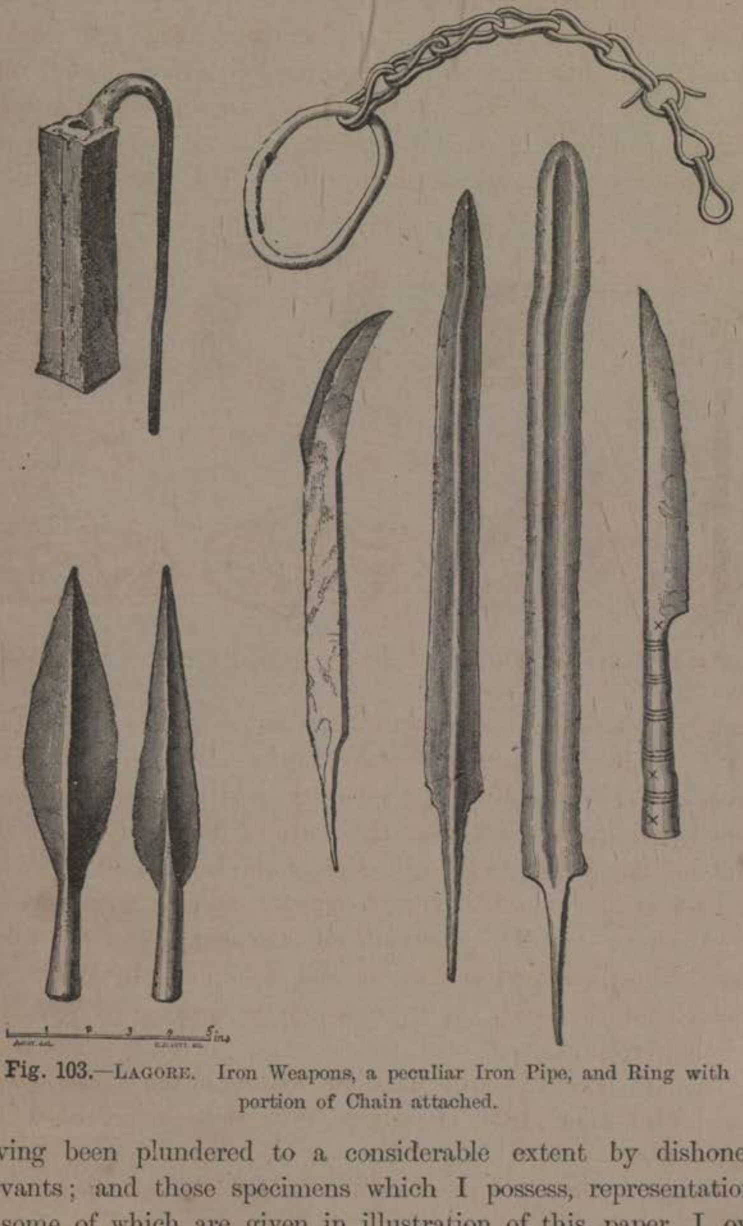

Fig. 103.—LAGORE. Iron Weapons, a peculiar Iron Pipe, and Ring with portion of Chain attached.

The following list comprises the various antiquities from Lagore then in the possession of Lord Talbot, and laid before the members of the Institute at the monthly meeting on February 2nd:—

Objects of Iron.—Two double-edged swords, one measuring 22¼ inches, inclusive of the tang which passed through the hilt; the blade, 18½ inches long and 1⅜ inch wide, was formed with a wide shallow groove along its entire length. The other sword-blade measures 15¼ inches and is formed with a central ridge. A blade, curved towards the point, in some degree resembling certain Oriental weapons; the curved portion alone has a cutting edge on both sides; length 13¼ inches, and width of curved portion 1 inch. Two spear-heads, in fine preservation and very sharp; length 10 inches. A peculiar single-edged weapon, resembling the glaive of simplest form, but of diminutive size, the blade measuring only 8 inches. An iron axe-head, length 7 inches. A peculiar iron pipe. (See page 431.)

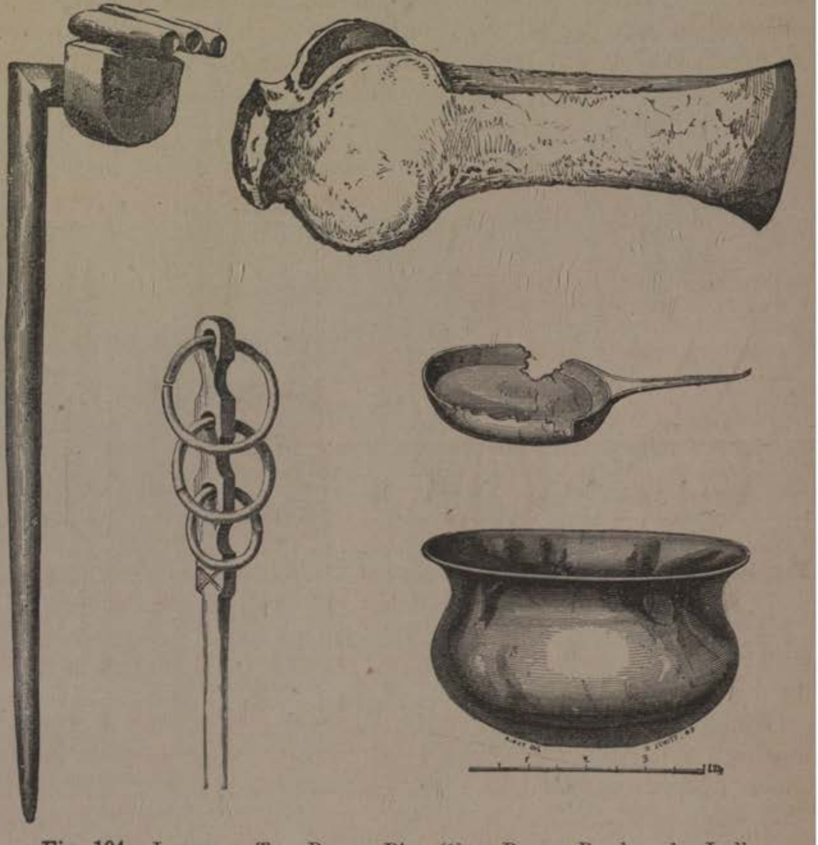

Fig. 104.—Lagore. Two Bronze Pins (½), a Bronze Bowl, and a Ladle and an Axe-head of Iron.

An iron ladle. An iron ring with portion of chain manacle (**Figs. 103** and **104**).

Bronze.—A small bowl 5¼ inches diameter, height 3 inches. Three armillæ of rude fashion. Portion of bronze ornament with enamelled work and exquisite finish. Portion of a ring fibula, with the extremities, between which the acus passed, dilated and flat. There are cavities in the metal in which enamel or some other ornament appears to have been incrusted. Portion of an object with interlaced ornamentation (**Fig. 105**), of unknown use. Several bronze pins of various fashion and size, from 3 to 6 inches in length. Four of these have movable rings appended to one extremity in lieu of a head. Another pin has a head of very singular fashion, as shown by the representation here annexed, of the same size as the original (**Fig. 104**).

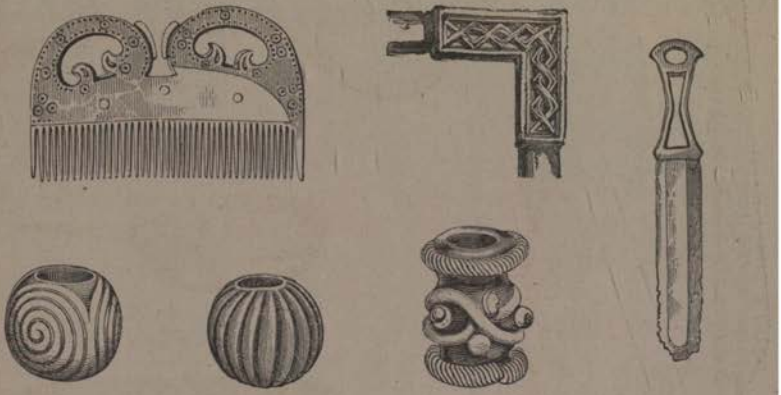

Fig. 105.—Lagore. Ornamented Bone Comb (⅔), portion of an object of Bronze with Interlacements, a Bronze Dagger 9¾ inches long, and 3 Beads.

Bone.—Two bone needles or bodkins, being perforated at the extremities, 2½ to 3½ inches long. A double-toothed comb of bone, rudely ornamented with lines and concentric circles, 3½ by 2¼ inches.

In April, 1887, through the courtesy and assistance of the present Lord Talbot de Malahide, I had the satisfaction of inspecting most of the above described objects, which are still in safe keeping among the art treasures of Malahide Castle. Illustrations of most of them are given on **Figs. 103** and **104**.

The objects from Lagore which went to the Museum of the Irish Academy, together with those in the Petrie collection (now belonging to the Academy), are in such a state of confusion, owing to the absence of distinguishing labels, and the want of harmony between the numbers on the objects and those in the official catalogue, that, notwithstanding several visits to the museum with the express purpose of identifying and singling out some of the crannog remains, I have been unable to make much addition to those already illustrated.

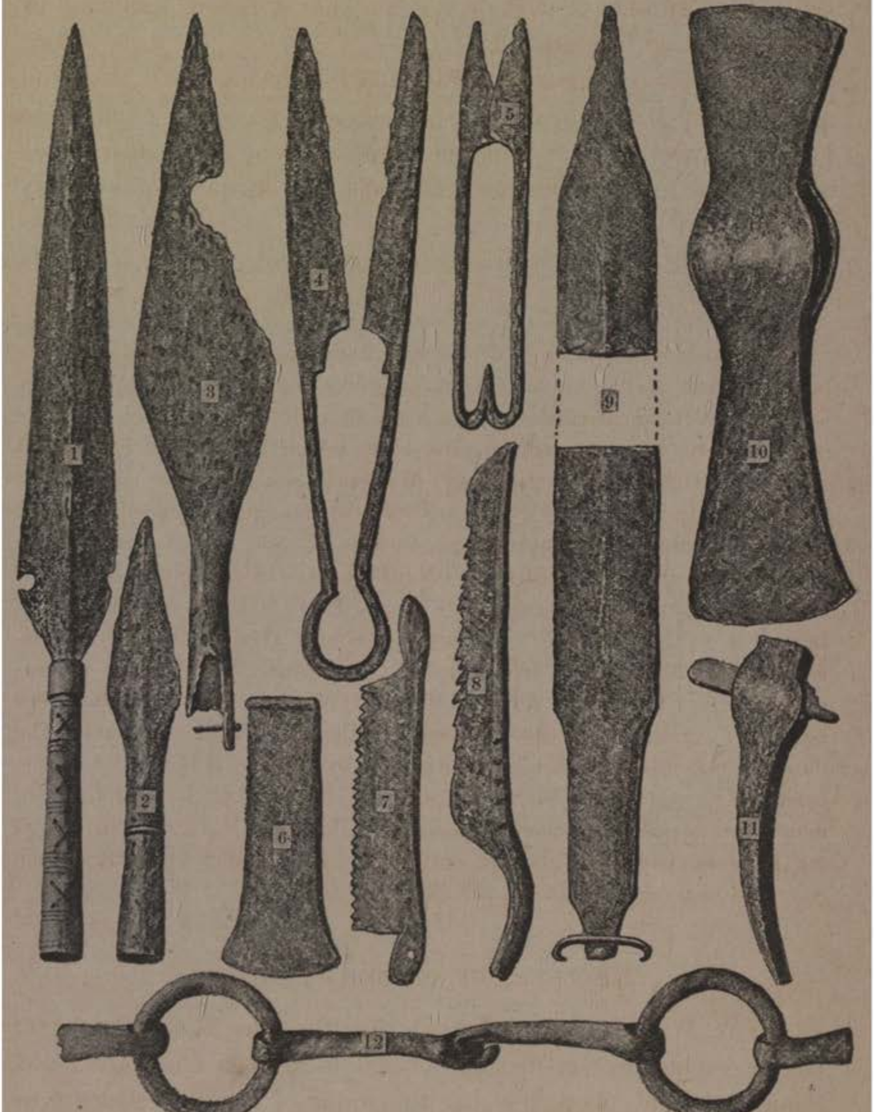

Fig. 106.—Lagore. Iron Implements and Weapons. All $\frac{1}{3}$ real size.

By the kind permission of the council of the Royal Irish Academy I am enabled to make use of the few woodcuts from Wilde's catalogue illustrative of objects from Lagore. They are as follows :—

The top of a pin ornamented with three movable rings (**Fig. 104**), an ornamental bone comb, a bronze dagger, and three beads (**Fig. 105**). The ribbed bead is opaque, with traces of a light green varnish, and is almost identical with beads found in the Scottish crannogs. Another is an inch long and has a raised ornament in white on a deep blue ground.

The objects represented on **Fig. 106** I have identified, with the assistance of Mr. Wakeman, as coming from the same remarkable locality. They are all of iron and represented one-third natural size, and will be readily recognised as tools and weapons of ordinary use.

In regard to the historic notices of Lagore Sir W. R. Wilde writes as follows :—

> " As the earliest discovered and examined crannoge in modern times has been that of Lagore, near Dunshaughlin, County of Meath, so, upon looking into the authorities, we find it the first alluded to. Loch Gabhair is said to have been one of the nine lakes which burst forth in Ireland A.M. 3581 ('Annals of the Four Masters'; see also Colgan's 'Acta Sanctorum,' p. 422, n. 14). In A.D. 848, we read that Cinaedh, son of Conaing, Lord of Cianachta-Breagh, in Meath, went with a strong force of foreigners, and plundered the Ui-Neill from the Sionainn (the Shannon) to the sea; 'and he plundered the island of Loch Gabhor, and afterwards burned it, so that it was level with the ground.' And in the old translation of the 'Annals of Ulster,' Codex Clarendensis, the passage is thus rendered :—" And brake down the island of Loch Gavar to the very bottom.' Again, in A.D. 933, the same authority informs us that—'The iland of Loch-Gavar [was] pulled down by Aulaiv O'Hivair,' and the cave of Knowth, on the Boyne, plundered during one of the Scandinavian marauding expeditions with which the kingdom was then troubled. Thus we have evidence that Lagore crannoge was occupied upwards of one thousand years ago." (B. 18, p. 229.)

DISCOVERY OF OTHER CRANNOGS.

Sir W. Wilde states that a few months after the discovery of Lagore, an island "artificially formed of timber and peat" was brought to light upon lowering the water of Roughan Lake, near Dungannon, on which "numerous fragments of ancient pottery and bones, a few bronze spear-heads," and an upper ornamental quern stone, were discovered. Other discoveries of a similar character are successively noted as having been made in various other localities. An island became exposed on the lowering of the waters of Lough Gur, county of Limerick, from which it is said a vast collection of bones and a great number of antiquities have from time to time been obtained. Among the latter is a most interesting stone mould (**Fig. 107**) for bronze spear-heads.* In 1845, Mr. Shirley, in his "account of the kingdom of Farney" (B. 8, p. 94), describes another crannog which was brought to light two years previously, as constituting "The island Ever Mac Cooley's house." "The foundations," writes Mr. Shirley, "of this ancient residence were discovered in the autumn of 1843, seven feet below the present surface of the earth, in the little island at Lisanisk, and two feet below the present water level of the lake a double row of piles were found sunk in the mud; they were formed of young trees, from 6 to 12 inches in diameter, with the bark on. The area enclosed by these piles, from which we may judge of the size of the house, was 60 feet in length by 42 feet in breadth." In the following year the same writer describes two other lake-dwellings in the same district, one in Lake Monalty and the other in Lough-na-Glack, on and around which the following relics were said to have been found:—

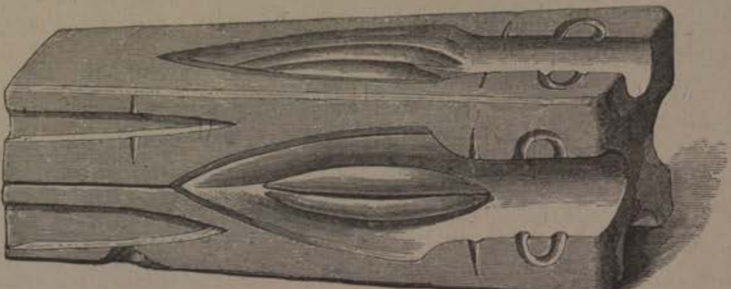

Fig. 107.—Lough Gur. Stone Mould, 6½ × 2½ × 1¾ inches.

> "Three bronze celts with loops on the sides, and the remains of the stick were found in one of them; a very perfect small dagger of bronze, one foot in length; two bronze arrow-heads, double pointed; a bronze gouge or chisel, rarely found in Ireland; the head of a bronze hunting-spear; part of a bronze sword or dagger; a bronze cap, apparently the end of a wooden hilt of some weapon; the bronze handle of a javelin or spear, with loop attached; the boss of a shield of bronze; a bronze knife which appears to have been gilt; a bronze knife or dagger, measuring 10½ inches in length; a smaller one 7 inches in length; a

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* *Archæological Journal*, vol. xx. p. 170.

bronze bolt, with loop, measuring 16½ inches in length—this was found sticking in the mud, close to the island on Lough-na-Glack; another, 12 inches in length, has been since found in the island itself. Of bronze ornaments found on these islands there are the following: Several bronze rings of different sizes, two of them with transverse spring openings, others hollow, and probably parts of armour or horse trappings; two bronze needles, one of them with the eye entire; a bronze pin, the head hollowed like a cup, and bearing a striking resemblance to the ends of the golden ornaments often found in Ireland; several bronze pins like modern shirt pins; parts of several bronze fibulæ or brooches, with fragments of several bronze instruments, rivets, etc.; a small circular bronze bell, like a sheep-bell; three harp keys of bronze of different sizes. Of other ornaments found on the island on Lough-na-Glack I may particularly mention several amber and blue glass beads, three bone pins, and a comb apparently of ivory. Of iron instruments, an iron dagger, measuring with the hilt 15 inches; several iron coulters of ploughs of very primitive form, 7 inches in length; parts of iron instruments the use of which it is impossible to determine; a long gun-barrel, 3 feet 8 inches in length, of that sort, I believe, formerly called a calliver; part of the lock of a pistol; many large bullets of lead were also found. I may add to this list a pair of quern stones, found on the Monalty Island; some burnt corn; remains of coarse broken earthenware vessels, and bits of thick dark glass; an earthen pot, shaped like a hat; another of Dutch manufacture, with the figure of a man's head below the spout, used in Ireland during the seventeenth century, and called grey-beards; some small Dutch tobacco pipes; cut oval stones, apparently intended for pounding in mortars; several circular stones, with holes in the centres, often found with ancient remains, and considered in Ireland to belong to the ancient spinning wheels; also several stones, or hones, of different shapes and sizes, for sharpening weapons and tools; a brass token, nearly defaced, probably of the reign of Charles II." (B. 9, p. 44.)

In 1845, when the lake of Corcreevy, county of Tyrone, was drained, its crannog was examined by Mr. Burnside, when the following articles were recovered from among its remains:—A pair of bronze and iron manacles, an ornamental comb of bone, parts of a musical instrument, an arrow-head, a spear-head, and a hammer-stone.*

BALLINDERRY.

About the same time the crannog in Ballinderry Lough, near Moate, county of Meath, became known, and appears to have yielded a large quantity of bones and antiquities, together with one or two canoes. From the number of objects now in the Museum of the Royal Irish Academy, and in private collections, said to be found on this crannog, it must have been an unusually rich repository of lake-dwelling relics; yet, singular to relate, Sir W. Wilde dismisses the subject by stating that he was indebted to Mr. Hayes, of Moate, for a description of the find, together

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* *Proc. R. I. A.*, vol. v. p. 215.

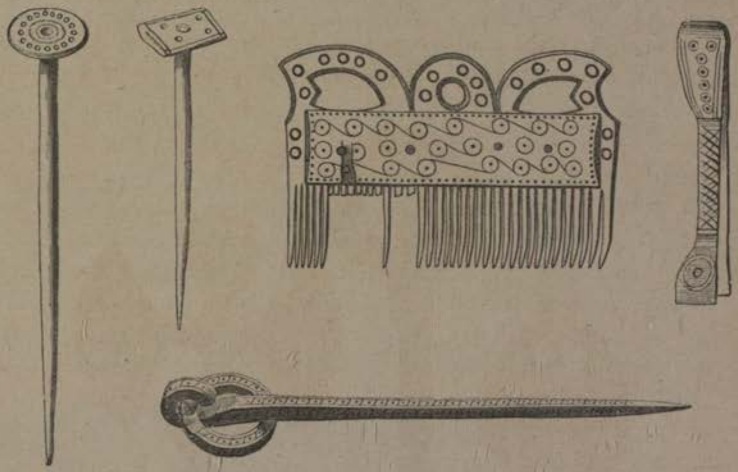

Fig. 108.—Ballinderry. Bone Comb (⅔), 3 Bone Pins, length 3⅛, 4½, and 5½ inches, and Bronze Tweezer (½).

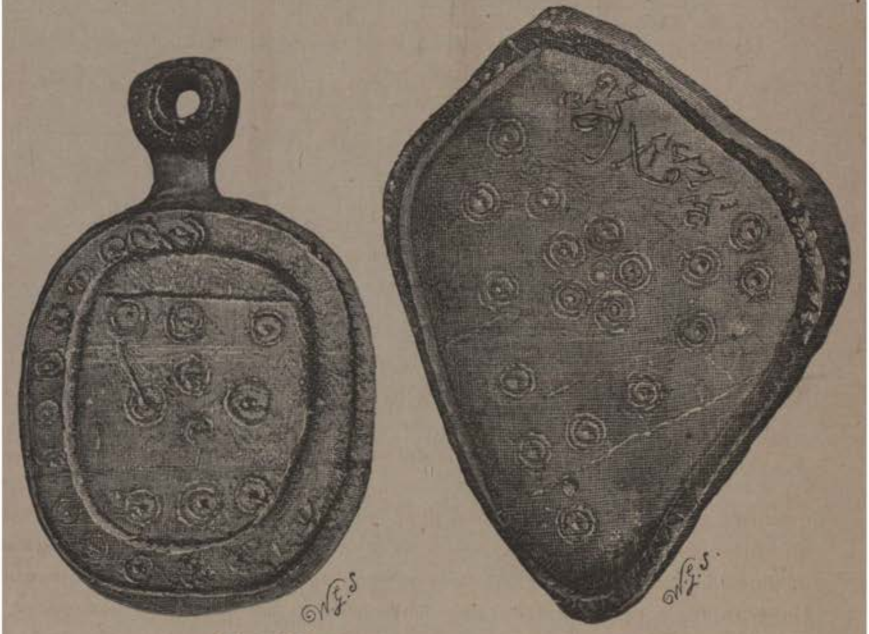

Fig. 109.—Ballinderry. Stone Amulets.

with a plan and map of the locality. On this crannog Mr. Graves, writing as late as 1883, makes the following remarks:—

> "There was a great crannog in this lakelet, surrounded by a stockade of oak piles. Around this and on the crannog was found an immense quantity of the antlers of the red deer, and the bones of deer, oxen, sheep, and other animals, which were sold as manure. A great and varied mass of objects of an archæological nature were also found on, in, and around the crannog, some of which found their way to the hands of various collectors, and some, I believe, are in the Museum of the Royal Irish Academy (**Figs. 108** and **112**), but unhappily no record or connected account of that great crannog or its finds has been preserved. Amongst the articles of wood which Mr. Browne secured was a portion of an ancient harp. The

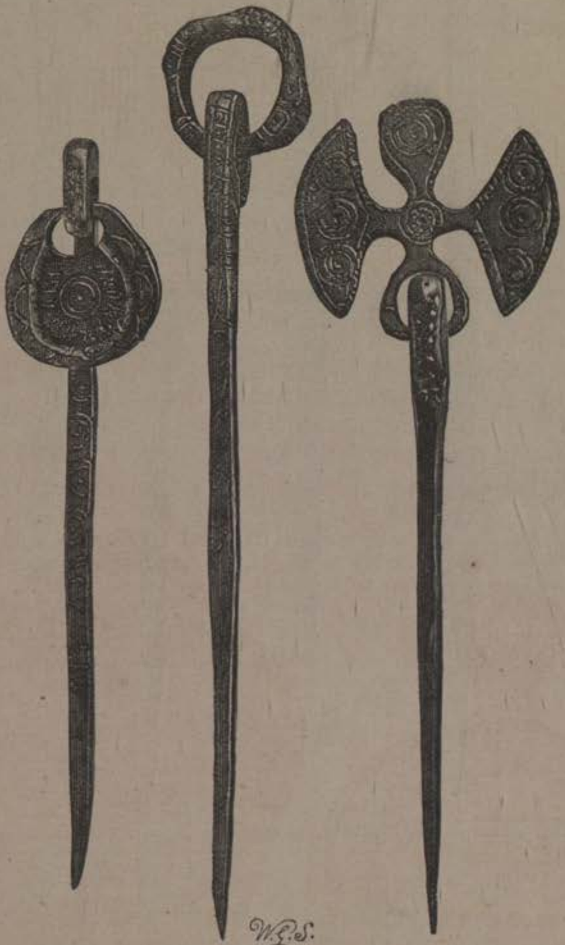

Fig. 110.—BALLINDERRY. Inscribed Bone Pins. Real size.

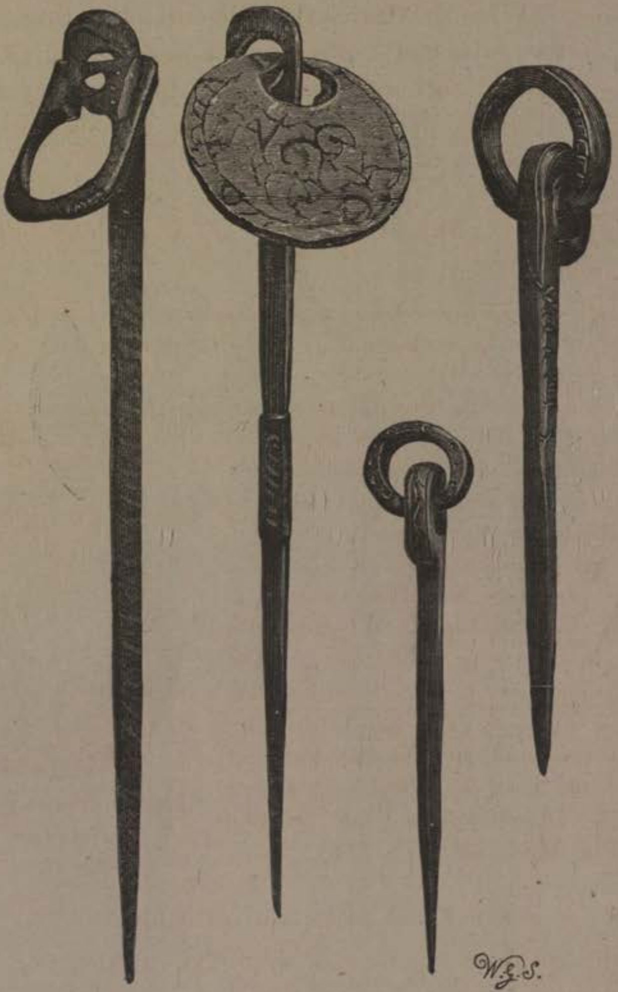

Fig. 111.—BALLINDERRY. Inscribed Bone Pins. Real size

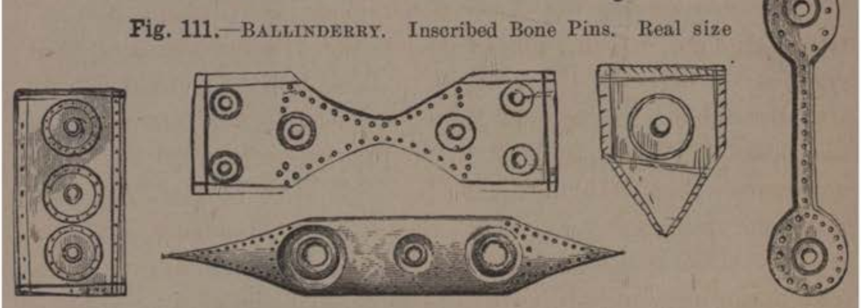

Fig. 112.—BALLINDERRY AND STROKESTOWN. Bone objects. All ⅔ real size.

pins and amulets exhibited on the occasion referred to have since been engraved, and I now describe them, beginning with the amulets (**Fig. 109**), which are here engraved from photographs full size." (B. 391, p. 196.)

It is suggested by Mr. Graves that the curious scorings on these pins are of the nature of Ogham and Runic writing (**Figs. 110** and **111**), but special authorities who have examined them do not support this theory. Moreover, I doubt the genuineness of both the pins and amulets.

LOUGH FAUGHAN.

Rev. Charles Archbold, writing of a crannog in Lough Faughan, county Down, says:—

"I found that the island was in a great measure, if not altogether, artificial. There were large stakes driven into the ground, and completely enclosing the space within, but not rising above the surface, so as to form a palisade, but evidently for the purpose of keeping in the soil from the encroachment of the water. The tradition respecting it is, that there had been a castle on the shore opposite, the chieftain of which caused this island to be made as a place of refuge from the sudden onslaughts of the O'Neills; and to render this retreat more secure he would never allow more than one boat or canoe on the lake. During the drainage of the lake some years ago, a canoe formed out of a solid piece of oak was found near the island." A jug of excellent workmanship was found on this crannog (**Fig. 113**). (B. 18, p. 224.)

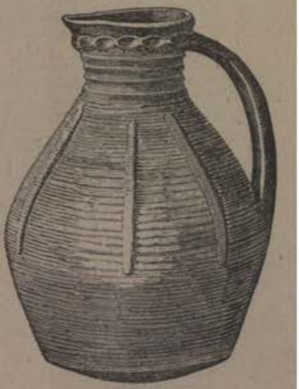

Fig.113.—Lough Faughan. Earthenware Jug, 13 inches high.

DISCOVERIES BY BOARD OF WORKS.

But the greatest discoveries were due to the workings of the Commission for the Arterial Drainage and Inland Navigation of Ireland, which brought no less than twenty-two additional crannogs to light in the counties of Roscommon, Leitrim, Cavan, and Monaghan. Reports of these crannogs by the engineers of the Board of Works, with plans, maps, and sections of the more important (**Figs. 114** and **115**), as well as the relics collected on them, were given to the Royal Irish Academy. Unfortunately these relics are now indiscriminately mixed with other Irish antiquities, and are virtually beyond identification.

Mr. Mulvany, Commissioner of Public Works, makes the following remarks on the general features of construction of the crannogs encountered by them during these drainage operations prior to the year 1852:—

"1. They are surrounded by stakes, driven generally in a circle from 60 to 80 feet in diameter; but in some cases the inclosure is larger, and of an oval shape, as, for instance, that in Loughtown Lake, which is 120 feet from east to west and 100 feet from north to south; and one of those in Lough Mac Hugh, which measures 118 feet in one direction and 74 feet in another.

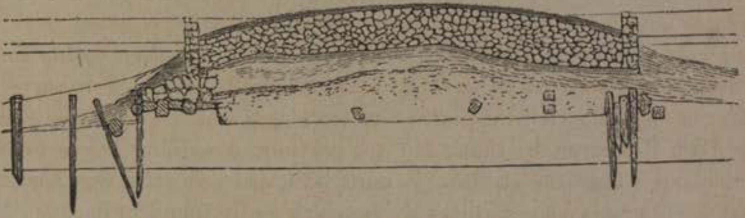
Fig. 114.—Section of Ardakillen Crannog, near Strokestown.

"2. These outside stakes are generally of oak from 4 to 9 inches in diameter; sometimes driven in a single row, sometimes double, and in some cases, as that of island No. 1 in Drumaleague Lake, the stakes are found in a single row in parts of the island, and in double or treble rows, or clusters, in other parts. The island in Loughtown Lake differs from the others in being surrounded by a mass of stakes upwards of 15 feet wide, and rather inclined towards the centre of the island.

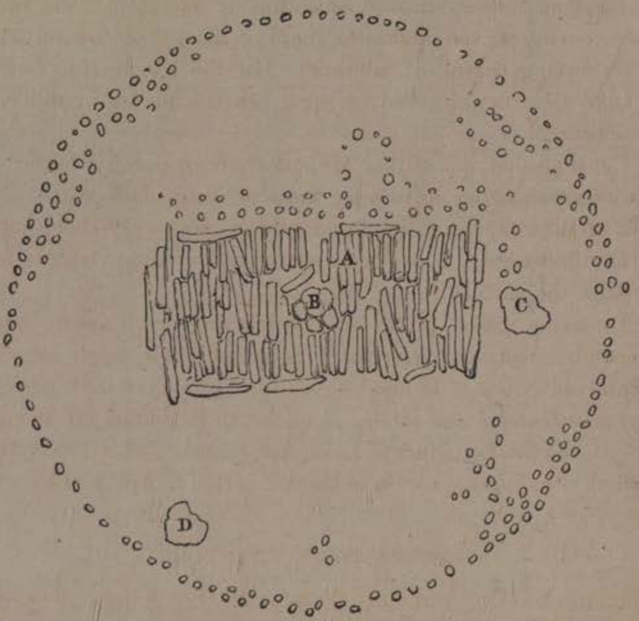

Fig. 115.—Plan of Crannog in Drumaleague Lough. Outer circle 60 feet in diameter.

"3. The portions of the stakes remaining in the ground are evidently the lower ends of young trees, or of branches of large trees, which were stuck down just as they grew in the wood; the thicker end downwards, and bearing the marks of the hatchet by which they were felled. A considerable length of these stakes must, therefore, have projected over the ground; and they may probably have been joined together by horizontal branches, interlaced so as to form a screen, well calculated to serve for shelter or defence. All the portions of the stakes which were above ground have been destroyed by time; but the portions remaining below ground, particularly where the stratum is pure peat, are generally very sound at heart, and have become as black as the oak usually found in bogs.

"4. The surface within the staked inclosure is usually covered over with a layer or two of round logs, cut into lengths of from 4 to 6 feet, over which are found more or less stones, clay, and gravel. In some cases where the foundation is very soft, as in island No. 2 of Drumaleague Lake, the layers of timber are very deep. In other cases, where the ground is naturally firm, the platform of timber is confined to a portion of the island.

"5. In almost every case a collection of flat stones has been found near the centre of the inclosure, having marks of fire on them, and apparently having served as a hearth. In the island No. 2 of Drumaleague Lake there were three of these hearths found in different parts of the enclosure.

"6. Considerable quantities of bones are generally found upon or around the island, being apparently those of deer, black cattle, and hogs; the skulls of the cows being long and narrow, with very short horns.

"7. In almost every case one or more pairs of quern stones have been found within the enclosure.

"8. In many cases pieces of oak-framing have been found, with mortices and cheeks cut in them. Some of these, such as what were found on island No. 2 of Drumaleague, appear to have been portions of an ordinary door-frame; but others, such as those found on the island of Lough Scur and in Loughtown Lake, are portions of a heavy frame, the use of which does not appear so evident." (B. 13, Ap., p. 44.)

STROKESTOWN CRANNOGS.

Adjacent to the ancient palace of the Kings of Connaught are three lakes, viz. Cloonfree, Cloonfinlough, and Ardakillen, in each of which one or two crannogs became exposed during the drainage operations of the Board of Works.

The following antiquities found in the lake of Cloonfree were presented to the Museum of the Royal Irish Academy, by Alonzo Lawder, Esq. (B. 11*a*, p. 219):—

"A horseshoe, made of iron; a fragment of iron, probably the hilt of a sword; an iron spike, for butt-end of a spear; a bone spear-head; a bone pin; two amber beads; a bronze tweezer; ditto, broken, but of different matter; a bronze pin with ornamented head, having a cross and arrow-shaped device carved on two sides of it; a very long bronze pin, with ornamented spike, head, and ring (a peculiarly fine specimen); a small iron pin, with head bound with bronze wire, and small circular disc pendant; a boar's tusk; and a buckle."

The crannog of Cloonfinlough was no less than 130 feet in diameter, and is thus described by Mr. Dennis H. Kelly (B. 11, p. 208):—

"It is constructed on oak piles (many of them showing the action of fire), driven into the soft marl at regular distances, and tied together by horizontal stretchers, so as to form a triple stockade round it, with an interval of about five feet between each stockade. Outside of this, to the north-westward, are a number of irregularly placed piles, stretching a short distance from the islet, and it was adjoining to them the great deposit of bones was found. The centre of these stockades was laid with trunks of smallish oak trees, placed flat on the marl, and all pointing to a common centre, thus forming a platform whereon the island itself was constructed. When it was first observed, there was, jutting out from the island to the lake, towards the west, a kind of jetty or pier, formed of a double row of piles and stretchers running parallel, about 8 feet asunder, and on which logs of timber were closely laid horizontally.

"Of this gangway, and of the stockades, there are now but very imperfect remains, so much has been broken up and removed by the peasantry.

"The deposit of bones, etc., close to this island, consisted of bones of cattle, deer, horses, swine, sheep, fowl, dogs, deer, both fallow and red, a few specimens (in general much broken) of the horns of the Irish elk, and one or two specimens of human remains, and amongst them a quantity of articles of a most miscellaneous description, some of apparently very great antiquity, and others of a much more recent date. Amongst these are spear-heads, bronze pins, some of exquisite workmanship, and scarcely any two of exactly the same form. A brass bowl, hammered out of the solid; two brass vessels, made of small pieces most curiously riveted together; a brooch of handsome workmanship; a variety of bone pins and implements; deer-horn combs, of very great artistic merit; horn discs, like backgammon men; knives, hooks, and hatchets of iron; swords and spear-heads; an iron implement, like what a baker uses for putting his loaves in the oven, made of sheet iron, curiously riveted together, and having in the centre a circular ornament, with a cross in it, that has evidently once had an arabesque pattern on it; sundry miniature frying-pans, and a small whetstone; single and double bronze rings; one coin of the Emperor Hadrian; one bulla, Pope Paul V.; sundry silver coins, most of them Edwards, and one so late as James, 1690, and one silver coin, unfigured in any collection that I have seen.

"Between the island and the ruined church were found two canoes, hollowed out of single oak trees, but neither of them much more than two feet wide; the stern of one of them was perforated with numerous auger holes, about one inch each in diameter.

"On examining the structure of the island itself, which was effected by cutting a trench 20 feet long by 5 wide, as near the centre as possible, there was found, at about eight inches under the surface, which was covered with rank grass growing in a rich mould, a very close-laid pavement of irregular-sized boulder stones. When this was removed, a stratum of black earth was exposed, with occasional fragments of bones through it of swine, fowl, sheep, cattle, and deer; and about six inches beneath this, a considerable layer of burned earth, with several inches of unburned clay under it. Then came a second very closely-laid pavement of large-sized, flat-surfaced stones, beneath which were alternate layers of black earth and burned clay and marl, reaching down to the log platform, and interspersed, like the one above it, with occasional bones and fragments of bones; some few human remains, viz. one skull, and portions of some more were got on the exterior edge. No coffin-stone, chest, or other sepulchral remains.

"Amongst these relics are knives, *some of which have failed in the forging;* combs in an incomplete state of manufacture, deer-horns *sawn* in sunder, and shavings as if *left after a turner*. From these I am led to think that, whatever may have been its original occupants, in later times the little island resounded to the busy hum of industry, and that the smith, the brazier, the comb-maker, and the turner, there drove a brisk trade, and sometimes solaced their leisure in the construction of pretty toys, like the tiny plate-bucket in the possession of the post-mistress of Strokestown, and whose neatness of finish would do no discredit to our best modern cabinet-makers. It is turned in oak, and hooped with brass, four and a half inches high, and four inches diameter. There was originally a pair, but one was unfortunately broken."

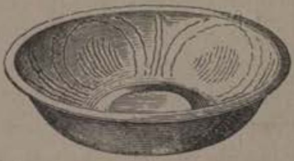

Fig. 116. — CLOONFINLOUGH. Bronze Dish, 7¾ inches wide, and decorated inside.

From Cloonfinlough only the following relics went to the Museum of the Irish Academy:—

"Small brass bowl (probably **Fig. 116**), iron bill-hook, long iron spear-head, iron shears, large tooth, portion of a hone stone, bronze pin with ornamented head and ring, bronze pin with ring, small bronze pin with perforated head, small bronze pin and piece of thick wire, bone needle and pin." (*Proc. R. I. A.*, vol. v., Ap., p. 61.)

A considerable collection from the same place has, however, found a safe resting place in the British Museum, of which the more interesting objects are here illustrated (**Fig. 117**).

In regard to the Ardakillen crannog Mr. Kelly writes :—"Near this was found a boat 40 feet in length and 4 feet across the bow, hollowed out of a single oak; and in which were a skull, a bronze pin, and a spear, which, by the liberality of Mr. R. Kelly, I am permitted to present to the Academy. The skull is perforated in the forehead, and has the mark of no less than twenty sword-cuts on it, showing the murderous conflict in which its owner must have been engaged; and near to it were found a neck-piece of iron and 20 feet of rude chain attached, that would do credit to the dungeons of Naples, and by which its unhappy victim was made fast." (B. 11, p. 214.)

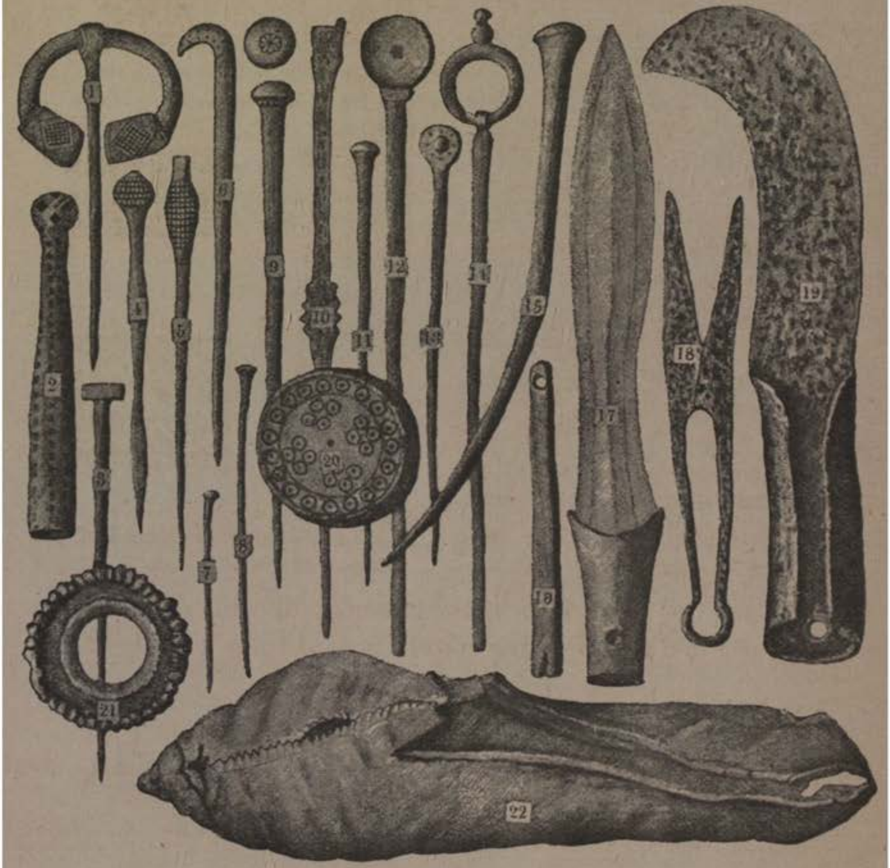

Fig. 117.—CLOONFINLOUGH. Nos. 17 to 19, 21 and 22 = ⅓, the rest = ⅔ real size. No. 2 is the upper portion of an inlaid Bronze Pin, enlarged.

On this crannog about fifty tons of bones are said to have been collected by the peasants and sold at two shillings per cwt. Of the industrial remains of its occupiers the following relics were given to the Museum of the Royal Irish Academy :—

"Large ornamented bronze pin with ring, bronze pin with solid ornamented head, five small bronze pins, bronze or brass harp pin, bronze hook, two bone needles, two bone spears, large tooth, spud of deer's horn, piece of hone stone, piece of stone ring, small piece of round stick, small silver ornament, iron hatchet and handle, iron gouge, iron knife-blade, part of iron hinge and large spike nail, wooden hoop and scoop, together with a parcel containing portion of wooden hoop, ashes of different kinds, a fragment of cinerary urns, bones and teeth of animals, old iron nails, knife-blades, etc." (*Proc. R. I. A.*, vol. v., Ap., p. 61.)

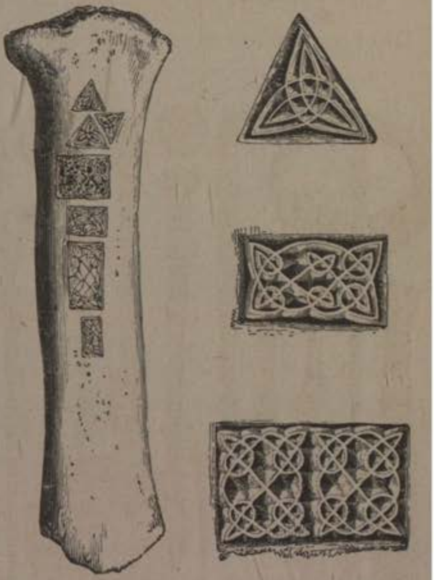

Fig. 118.—STROKESTOWN. Carved Bone, $8\frac{1}{2}$ inches long. Showing 3 of the devices full size.

Among the relics from these crannogs illustrated in Wilde's catalogue I find the following in addition to those already given.

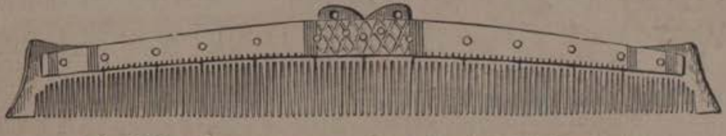

Fig. 119.—STROKESTOWN. Bone Comb, 10 inches long.

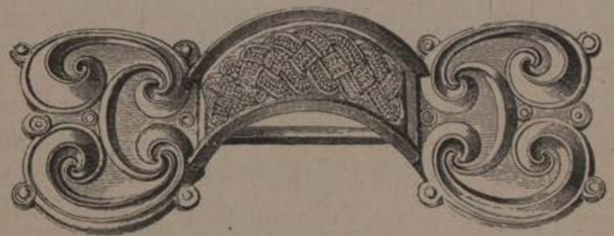

Fig. 120.—ARDAKILLEN. Bronze Brooch with late Celtic ornamentation ($\frac{1}{1}$).

A bone with carved devices of interlaced work (**Fig. 118**), somewhat similar to those on a bone from Lagore already noticed.

Portion of a handsome bone comb, 10 inches in length, with a frame back riveted together with iron nails. The engraving shows the comb restored (**Fig. 119**). From Ardakillen there is a beautiful bronze brooch with late Celtic ornamentation (**Fig. 120**), and from Lough Scur a stone mould for casting bronze axes (**Fig. 121**).

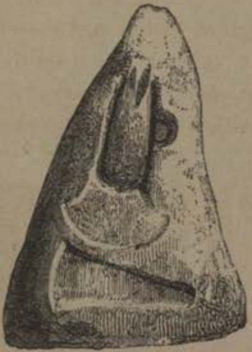

Fig. 121.—LOUGH SCUR. Stone Mould for casting Bronze Celts, 7½ inches long.

LOUGH RAVEL NEAR RANDALSTOWN.

In addition to Sir W. R. Wilde's notes on the great crannog near Randalstown (B. 24), some very interesting observations on the antiquities found on it are given in the *Ulster Journal of Archæology*, vol. vii., supplementary to Troyon's account of the Swiss Lake-dwellings. (B. 27.) The most complete account, however, is that of the late Mr. Ed. Benn, from which I take the following extract:—

"The island near Randalstown," writes Mr. Benn, "was a very large and important one, said to have been occupied by a member of the O'Neil family. The lake on which it stood has been long since drained, and a peat moss now occupies the place, which has been yielding antiquities for the last twenty or thirty years, and still produces some annually. A good idea of the importance of this island may be formed from the number of tools and appliances for carrying on the ordinary trades which have been discovered on it, as the tongs and anvil of the smith, which latter is a rough lump of iron somewhat smoothed on one side, and weighing fifty or sixty pounds. Its use as an anvil is only conjecture; but it is thought a highly probable one, and, if correct, it shows the difficulty of procuring in those rude times a piece of iron large and heavy enough for such a purpose. Then there were found also the crucibles of the brass-founder, one unused, and several greatly worn and burned out. The perfect one is very neat and good, and about the size of a small hen's egg. Then we have next the scissors and two needles of the tailor; one of the needles is about the size of what is called a darning-needle; the other long and strong resembling a packing-needle, such as is used for sewing sackcloth: both are made of brass, and well formed. There was also found the awl of the shoemaker, a very curious article, and apparently older than the other things; the blade of this awl is of brass, and the handle of stone. Several axes or hatchets of the carpenter have turned up, very like those of the present day; also a pair of small shears, such as are used by weavers. Connected with agriculture were found a very small sock of a plough, a curious spade, very light, about four feet long, all of wood, but neatly tipped with iron on the edge; and a pair of very large shears, for clipping sheep. There was also a netting-needle of iron; but few warlike weapons of any kind. None of the latter, indeed, came within my observation but an iron sword and a very good battle-axe, such as was used by the galloglasses; it is shaped like the axe used by coopers, and is very interesting from its rarity." The further objects described by Mr. Benn are

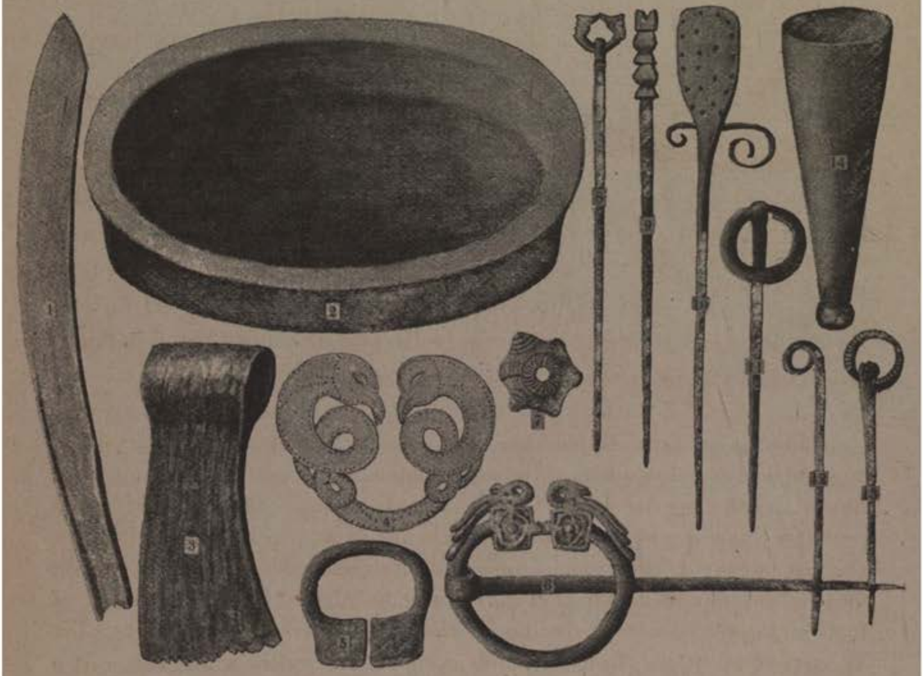

Fig. 122.—Lough Ravel. No. 2 = 1/6, 3 and 14 = 1/4, and the rest = 1/2 real size.

pins of brass, iron, bone, and wood, generally from 3 to 5 inches long; a large glass bead and a small crescent-shaped piece of glass; a button with two eyes; a horse-shoe; a few fragments of pottery; a wooden scoop; a brass dish 15 inches across, including the rim, which is an inch and a half broad: it is rather more than 2 inches deep; some knives; a comb, neatly made of bone and riveted with iron nails. "Besides the things here enumerated, the bog around the Randalstown crannog has already yielded several boats and parts of boats: these were all hollowed out of large trees and were very well formed. One of large size, and quite perfect, has been taken out lately from beneath sixteen feet of moss. It has been stated, when first raised, it retained its original form entire, but soon became warped and out of shape. In the bottom of this boat lay a very neatly made oak paddle, about three feet and a half long, and a wooden bowl capable of holding nearly a quart. It was very thick and rude-looking, not made by turning, but by hollowing out of a solid piece, like the boat itself." (B. 29, p. 86.)

Some of the relics from the Randalstown crannog I have been able to identify in the Belfast Museum, and a few others from the same place I found in the collection of the Royal Irish Academy at Dublin. These, together with a silver brooch copied from the *Journal of the Royal Historical and Archæological Association of Ireland* (B. 215), and three bronze brooches from the *Ulster Journal of Archæology*, vols. iv. p. 269, and vi. p. 103, are illustrated on **Fig. 122.**

TONYMORE.

The next important lacustrine discoveries were made in the loch of Tonymore, county Cavan. It appears that this small lake was celebrated for its pike-fishing, and contained a dry mound or island about 50 yards in diameter, which was much resorted to by sportsmen. That this island was a crannog was never suspected till a considerable time after it had been drained in consequence of the railway having to pass through it. Though wooden piles and some relics were then found, the real nature of the discovery was not understood till the publication of Sir W. R. Wilde's catalogue of the Museum of the Royal Irish Academy in 1857, which gave an account of several similar stations. Among the relics then collected at Tonymore were several querns, sharpening stones, a yew bow, and (in the lake mud) two elks' heads.

In 1862 Lord Farnham caused further examination of the mound to be made under Dr. Malcomson, of Cavan, from whose report the following facts are derived (B. 60, p. 274):—

> "The piles or stakes were arranged in two circles, one within the other; the diameter of the greater one being 120 feet, that of the other about ninety feet. The piles in the outer circle were very numerous; and, in some instances, driven in close proximity to each other. A few, having withstood the ravages of time, appeared about three feet above the surface, and, upon being withdrawn and examined, were found to have been carefully pointed. The stakes in the inner row were not so numerous, nor were they altogether composed of oak, some of them being of sallow or other soft wood.
>
> "Within the stockades were observed two small mounds (upon which the grass was much more verdant than upon any other part of the island), one at the north and the other at the south. Corresponding with the

depression between these, and 3 feet under the soil, we found, during the excavation, a flat stone, about four feet square and 3 inches thick, resting on a number of upright blocks of decayed oak. This, no doubt, was a hearthstone. Besides the wooden stakes entering into the formation of the circles, others appear to have been laid horizontally, their beam-like ends showing at that part of the enclosure which was disturbed by the passage of the railway. When the excavation had been carried to the centre, the cut surface presented, from above downwards, the following section: 1st, clay; 2nd, black and grey ashes with small stones and sand; 3rd, bones and ashes, with lumps of blue and yellow clay; 4th, a quantity of grey ashes; and 5th, the horizontal sleepers or stretchers, and hazel branches resting on the peat bottom.

"On the same marsh, and about one hundred yards' distance from the island, but nearer to Tonymore Castle, are two other stockaded forts, on a raised plateau. They do not appear to have been islands, as an elevated causeway leads from them to the mainland; but otherwise they resemble the crannoge in their stockaded and mound-like appearance."

The antiquities collected on the crannog were presented to the Museum of the Royal Irish Academy, among which were the following, thus described by Sir W. R. Wilde:—

"A very perfect quern, 17 inches in diameter, with the upper surface of the top stone highly decorated; found at the bottom and near the centre of the crannog. Several pieces of iron slag; a barrel-shaped piece of wood 3¼ inches long, hollow throughout, and perforated with six holes; three flat circular stone discs or quoits, averaging 3¼ inches in diameter, and half an inch thick; a most perfect and highly decorated mortar, 8 inches high by 17½ wide, decorated at the corners with four grotesque figures; a stone mould; a four-sided whetstone 20 inches by 3, and eleven fragments of smaller sharpening stones, of which two are perforated.

"A large oval and five globular stones; a flat red touchstone of jasper and a stone shot 3 inches in diameter; two weapon-sharpeners of remarkably hard stone.

"Two large bone beads; a variegated enamel bead; a large irregularly shaped amber bead; a smaller one of enamel paste, showing a mixture of red, yellow, and blue colours; and also a small blue glass bead.

"Two imperfect bone combs, like those already figured in the catalogue at p. 272 (**Figs. 105, 108,** and **119**).

"A bone ferrule 2½ inches long, solid at one end.

"Fourteen portions of pottery, some rudely glazed, others burned, and some only backed; and consisting of fragments of various vessels used either in the arts or for domestic and culinary purposes, such as crucibles, pitchers, and bowls. Among these is a fragment of a bowl or urn, of unglazed pottery, highly decorated with deeply grooved lines on the outside, and slight indentations on the everted lip. It is of great antiquity; composed of very black clay, darkened still more by the long-continued action of the bog, and mixed with a quantity of particles of white quartz or feldspar, which was probably added to give it stability. A similar description of art may be remarked in some of our oldest mortuary urns. When we consider that, except the urns which must be referred to the Pagan period, we have scarcely any examples of ancient Irish pottery, these specimens possess a peculiar interest for the investigators of fictile ware.

"Fragments of Kimmerage coal rings; probably part of a bracelet, which seems to have been jointed at one end.

"The bowls of two small pipes, similar to those in the Museum, and usually but erroneously denominated 'Danish tobacco pipes.'

"An enclosed ring of bronze, 3¼ inches in diameter; a large decorated bronze pin, 7½ inches long; and a smaller one, 3 inches in length.

"An iron knife-blade, with perforated haft, 8½ inches long: this article looks as if it had been attached to a long handle; a smaller blade, with tang for haft, 2¾ inches in length; a globular piece of iron 2¾ inches in diameter, like a crotal, with an aperture on one side; the head of a small iron hammer; three portions of rings, and eleven other iron fragments, the uses of which have not been determined.

"A small perforated stone, like a whorl or distaff weight." (*Ibid.*, p. 290.)

FURTHER DISCOVERIES.

Mr. G. H. Kinahan's observations on the Irish crannogs, which now (1863) began to appear, have greatly contributed to the dissemination of a correct knowledge of their structure and geographical distribution. His notes on the crannogs of Lough Rea (B. 58), Ballinlough (B. 70a), Lough Nahinch (B. 70b), and Lough Naneevin (B. 118), which successively appeared in the Proceedings of the Royal Irish Academy, were followed in 1872 by an article on "Lake Stone-dwellings in Connaught" (B. 214), in which he shows that in some cases dry stones were substituted for the ordinary wooden structures and rubbish of which the artificial islands were usually constructed—a fact which finds many parallel illustrations in Scotland.

Mr. Kinahan says that Reed's Island, Shore Island, Ash Island, and Island M'Coo, in Loughrea, are crannogs; while Blake's Island may also be one. From Shore Island 300 tons of bone were procured, among which was the head of a *Megaceros Hibernicus* which measured 13 feet from tip to tip of its horns. Amongst many relics found here made of stone, horn, and wood were a few metal objects, as iron shears, a brass pin, a crozier made of brass, a battle-axe, a cast for a coin, and a hammered iron vessel.

The only other writer on Irish crannogs to whom I find it necessary to allude in a special manner is Mr. W. F. Wakeman. Personally acquainted with Petrie and Wilde, and probably deriving inspiration from their enthusiastic devotion to archæology, and an eye-witness of the first great crannog find at Dunshaughlin, Mr. Wakeman has ever since been a careful observer of the antiquities of his country. His special attention to crannogology dates only from 1870, but since then scarcely a year has passed without his pen and pencil being in requisition to record some fresh discovery in this field of research.

In early times no district in Ireland presented more favourable conditions for aquatic retreats than the county of Fermanagh, with its countless lakes and bogs, interspersed and embosomed in the primeval forests which were then extant. These advantages would appear to have been fully recognised by the crannog-builders, as we find more remains of these lacustrine abodes here than in any other part of the island. The number of crannogs now recorded in this county amounts to about 40, but of course this is by no means the full quota that might be disclosed by the adoption of a general system of exploration. Such exhaustive methods of research have not as yet, however, taken deep root in Ireland, so that the few reliable data of this character that have come to light we cannot afford to pass over, even in this brief sketch. The following extracts from Mr. Wakeman's reports are selected for the purpose of illustrating the structure of these remains in this part of Ireland, and the general character of the relics left on them by their inhabitants.

BALLYDOOLOUGH.

Ballydoolough ("town of the dark loch") is a small sheet of water some five miles from Enniskillen, in which there is a small island which, in 1870, was recognised as a crannog, and subsequently investigated.

> "It contained, in wonderful preservation, three-fourths of the foundation of its original log-house, the beams of which were mortised together, and further fastened with pegs of oak. The antiquities here discovered were very interesting, and consisted of stone, wood, bronze, iron, a mixed metal, probably findruine, and pottery of which I have given examples in this and former papers. The most curious relic noticed here was an Ogham stone, which has been pronounced the most northern monument of its class

yet discovered in Ireland. The pieces of pottery were very numerous, and usually exhibited ornamentation of an extremely early kind, amongst which chevron patterns similar to those found upon 'sepulchral urns' were conspicuous. The bronze articles were a thin plate of genuine antique bronze, supposed to be part of a vessel; a looped pin about 4¾ inches in length; a thin ribbon, and an article apparently belonging to horse-furniture. Two iron knives, one of which had traces of bronze-mounting, were also picked up: these resembled like articles found in barrows in England. A brooch, partly composed of a white metal, probably findruine, also occurred, as well as a portion of a shoe of a small horse or ass. There were quern stones, whetstones, a crucible, and numerous pieces of iron slag. All the portions of vases found were composed of earth and sand, fire-hardened. There was no glazing or trace of the use of the wheel. Many of the specimens were furnished with handles or ears. A solitary vessel of wood, probably yew, was discovered entire, but reduced almost to a state of pulp. Among other relics were so-called sling-stones, immense quantities of hazel-nuts, three canoes, each formed of a single piece of oak, and a small oaken vessel formed of staves." (B. 217, p. 314.)

"THE MIRACLES."

At another locality bearing the singular name of "The Miracles," situated near Monea, and now a bog, but formerly a lake, a crannog was revealed by the turf-cutters.

"Amongst the stone articles were the usual class of whetstones, and two circular grinding-stones, the only specimens of their kind I have ever heard of as having occurred in a crannog. The larger measures 8 inches across; the smaller is now in the Museum of our (Kilkenny) Association, it having been presented by Mr. Plunket. The material of both is close, yellow sandstone. The bones here were numerous, and of the usual crannog class. Single-piece canoes had from time to time been found in the surrounding loch. The remains of pottery found here were unimportant; but at least one very good crucible, as well as iron slag and charcoal, were turned up." (B. 217, p. 320.)

LOUGH EYES.

Lough Eyes (anciently *Tobernasoul, i.e.* "the Well of the Eyes"), a small lake only two-thirds of a mile long and a quarter broad, contained a number of crannogs. The largest is 288 feet in circumference, and has a maximum height above the lowest summer level of 10 feet, and is therefore never entirely submerged. "Stockading still exists in a very interesting state of preservation. To the west and north-west the stakes are four deep, and are placed so close together as almost to touch. They are all, or nearly all, of oak, roughly worked, and sharply pointed by a metal axe or adze."

A large quantity of broken pottery, like that from Ballydoolough, and some flat pieces, apparently lids, and a club of deer-horn, were found on it. Iron slag, pottery, bones, etc., were found on all these crannogs. (B. 191, p. 553.)

DRUMDARRAGH, OR TRILLICK.

This lake is now nearly drained, and its crannog, which measured 130 feet in diameter, has recently been re-investigated by Mr. Wakeman, who thus describes the result:—

"Upon examination, the work presented the usual layers of bog, earth, and stones, mixed with small trunks and boughs of ash, alder, beech, yew, oak, and other trees. Here and there, at different levels, were masses of ferns and furze. The outer edge was strongly piled with young trees, of the description above referred to; the great majority, however, being oak. Owing to the softness of the surroundings it was impossible to completely trace the piling on the side of the island which faces the ancient loch bed; but on what may be called the land side the stakes formed six rows placed somewhat regularly, with usually a space of about two feet between each set, sometimes, however, they were close together, nearly touching. The stakes stood about thirty inches asunder, and such of their numbers as were disturbed for the purpose of examination presented sharply-pointed ends, the result evidently of powerful and well-laid strokes of a very keen metallic hatchet or adze.

"Being anxious to find whether the crannog rested upon a frame of timber, as a tradition of the place stated, and in order, if possible, to discover the internal construction of the work, I caused several trenches to be excavated in various places within the staked enclosure, and then, with a long crowbar, probed as far as that instrument would reach. The result was that we struck upon several large and solid pieces of timber, but in what position they were laid or whether in any way attached to others it was impossible to determine, owing to the influx of water, and to the spongy character of the bog-stuff, branches, etc., through which the iron pierced. Throughout the island—placed apparently without any attempt at symmetrical arrangement—were several stakes of the same kind, but larger than any found in the inclosing lines of piles. These timbers I believe to have been simply intended to act as stays or binders to the body of the crannog. They certainly did not indicate partitions. There was no trace of wattlework, nor was there any example of timber presenting mortise-holes observable.

"During the process of excavation it became perfectly manifest that the mound of the crannog was the work of three several periods. Within a couple of feet of the present surface, near the centre of the island, were found several large red sandstone flags, still exhibiting traces of the action of fire, and surrounded by charcoal, pieces of charred wood, bones of deer, sheep, pigs, goats, and other animals, many of them evidently split for the marrow. Here also were some fragments of pottery which had, no doubt, formed portions of culinary vessels; part of an iron knife of early type; a second and much smaller knife of iron, to which a wooden handle had been attached by rivets; a piece of iron spirally twisted; a nail or pin of the same metal, and a broken whetstone of the usual crannog class. I should here observe that for many years past the mound had been subjected to rude tillage, and consequent denudation, and that quern stones of the 'pot' and more ordinary type, belonging in all probability to this layer, had been found near the hearth, and but a few inches above it. These are now preserved in a neighbouring cottage.

"The second hearth was about two and a half feet lower in the soil, and placed at a distance of a few feet south-east of the former, from which it scarcely differed, except that its vicinity was much more prolific in bones, broken pottery, charcoal, and other 'kitchen-midden' waifs.

"The third and lowest hearth, or rather fire-place, for no large stones appeared, lay about eighteen inches lower than that last described, and nearly beneath it. In connection with both, and mingled generally in the soil—above, below, and for a considerable distance around—were broken animal remains; innumerable teeth of swine, deer, etc., boar-tusks; charcoal; 'burnt stones;' a bead of jet; a bronze harp peg; an animal's head in iron, probably the leg of a pot; an article of iron resembling a small, narrow, double axe-head or pick; rude, oval-shaped hammer-stones; a well-formed knife of trap; an admirably-worked 'thumbflint;' a core of flint from which flakes had been struck; portion of a whetstone, and, finally, fragments of the sides and bottoms of fictile vessels, together with ears or handles of the same ware." (B. 441, p. 372.)

COAL-BOG, NEAR BOHO.

Mr. Plunket, who examined the remarkable find which was brought to light here in 1880, thus describes the wooden structures met with:—

"After a minute inspection, I perceived that we were standing on what was once an artificial island, oval in shape, slightly elevated in the centre, and dipping with a gentle slope on all sides, the outlines of which can still be easily traced. It is 60 yards long, and 14 yards across at its greatest width. Piles, or stakes, with rudely-sharpened ends and varying in size, are found at intervals all over this area, and rough oak planks, about the size of railway sleepers, may be seen lying in rows here and there, and generally resting on a layer of branches, the whole being covered over with a stratum of clay and stones, mingled with charcoal and ashes. It is quite manifest that this is the site of an ancient crannog, or artificial island. The surrounding depression, now filled with peat, known as the Coal-Bog, and covering some scores of acres, once formed a large sheet of water." (B. 345, p. 66.)

Here perforated posts and frameworks of what were supposed to have been wooden huts were found. In one place a wooden structure measuring 11 feet 10 inches by 6 feet 3 inches, formed of rude wooden beams, with roughly-executed mortises, was found no less than 21 feet below the surface of the peat. Two flint implements, several fragments of hand-made pottery, devoid of ornamentation, broken hazel-nut shells, and in the vicinity, at the same depth in the peat, a few wooden dishes. The stool of a huge *pine tree,* which, "before its decay, must have measured 14 feet in diameter," was found 2 feet above the level of the floor of the hut, which sent its roots downwards.

Subsequently Mr. Wakeman states that near this crannog lumps of "bog butter," rolled up in cow-hides, were found, and that the wood of the huge root of the tree above referred to turned out on analysis to be *yew,* and not pine.*

LISNACROGHERA.

Amongst the more recently discovered lake-dwellings were one at Lisnacroghera, near Broughshane, and two in Lough Mourne, both localities being in county Antrim. The former came into notice some six years ago in consequence of the discovery in a peat bog of some remarkable iron swords, with bronze sheaths, together with other military weapons. The bog in which these objects were found occupies the site of a former lake, which, till recently, retained so much water as to prevent the working of the peat for fuel. To remedy this the outlet was deepened, and so new or undisturbed portions of the bog were brought within reach of the peat-cutters. The antiquities were found from time to time in a circumscribed area, within a small plot belonging to one of the neighbouring farmers. When attention was first directed to the locality, and the workers questioned as to the circumstances in which the relics came to light, it appears that some kind of wooden structure was encountered, which, however, had been entirely removed before being seen by anyone competent to form an opinion as to its nature. In August, 1866, I visited the locality, and closely questioned the farmer about this woodwork, but failed to elicit any definite information. He was quite clear, however, about the existence of stakes and irregularly disposed beams and brushwood, which at the time he thought little about. From his description, and some remnants of oak beams, some showing the usual mortises, there can, I think, be little doubt that it was a crannog, but of no great dimensions. Close to where the peat had been cut there is an undisturbed structure of stones just cropping through the turf, which may yet turn out to have some relationship with the crannog. As to the relics, there is no record of their association with the crannog beyond the fact of their being found in its vicinity. Canon Grainger, who has taken much interest in this find, has secured for his private museum a large number of the relics from Lisnacroghera, but he fears that, since the crannog has become famous, he has occasionally been imposed upon by having presented to him, as coming from it, objects which in reality had been found elsewhere. This, in my opinion, partly explains the presence of such incongruous objects as are now to be seen in the Canon's collection. Among these are especially some arrowheads and scrapers of flint which cannot be distinguished from analogous objects picked up on the neighbouring fields. Besides the weapons with bronze mountings, there is in short an assortment of remains which might be classed as belonging to all ages—a stone celt, rubbers, flint arrow-heads and scrapers, down to an iron reaping-hook, a hedge-cutter's knife, and a portion of an old gunlock.

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* *R. H. Arch. As.,* vol. v., 4th S., p. 330.

But the special interest of the Lisnacroghera crannog lies in the remarkable series of military weapons which it has yielded, consisting of iron swords and ornamented sheaths of bronze, iron spears with long wooden handles and bronze mountings, together with a variety of other bronze objects, probably the mountings of shields. These I shall now proceed to describe.

Sword-sheaths.—Up to the present time four sheaths (**Fig. 123**, Nos. 1 to 4) have been recovered, but only one is entire, the rest being more or less in a fragmentary condition. They are all made of thin bronze riveted together at the margins, and over this there is a bead which, towards the lower third, develops into an elegant ornamentation very similar to that which we have already seen on the sword-sheaths of La Tène (See **Fig. 87.**) The perfect sheath (No. 1) is devoid of ornamentation, except that formed by the marginal bead; but the other three (of which only

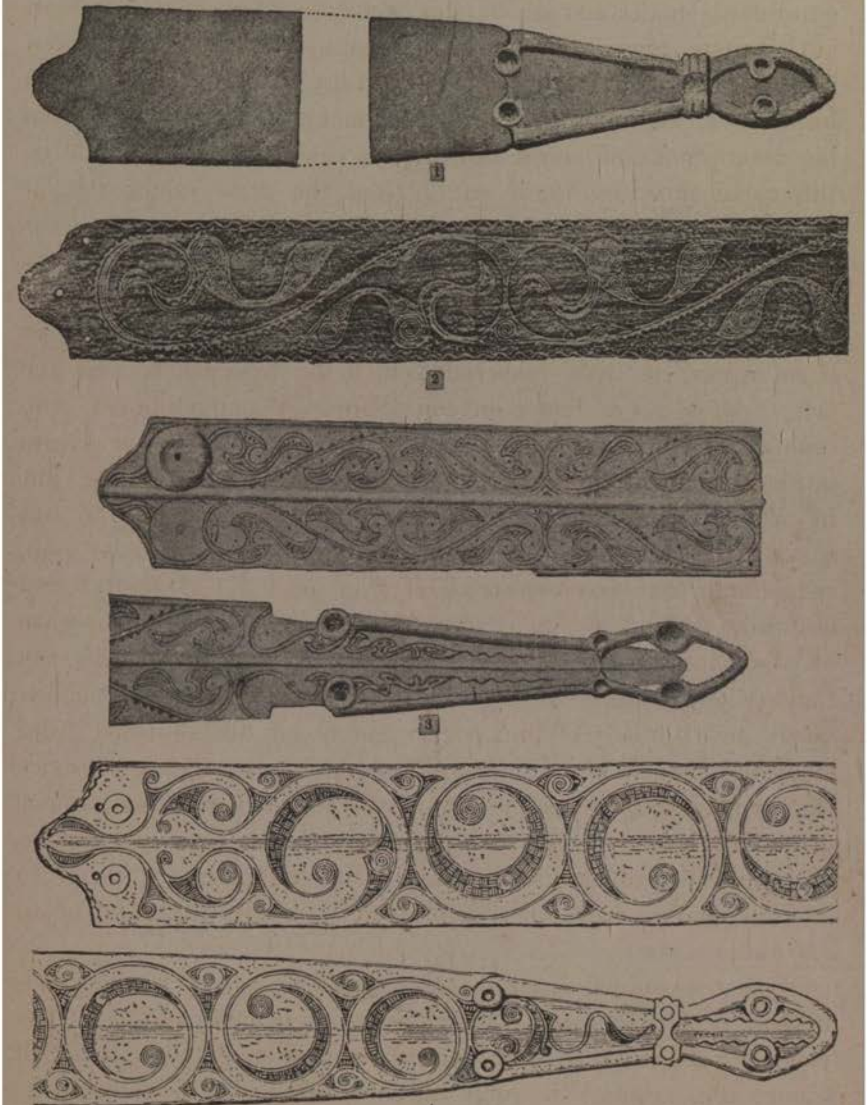

Fig. 123.—Lisnacroghera. Sword Sheaths of Bronze. All ½ real size.

one side of each remains) are decorated with highly artistic designs formed by incised lines, the details of which will be readily seen from the illustrations. No. 1, which still retains the blade of an iron sword firmly adhered to it, is 17½ inches long. No. 2 is defective at the tip, besides having lost its surrounding bead; it measures, in its present condition, 19 inches in length. The illustration here is a reproduction of a rubbing reduced half size and shows only the upper half. The design which comes out in white lines is in reality incised lines and corresponds to the dark lines in the other two. No. 3, the largest of the group, measures 22 inches in length. Both ends are here represented. No. 4 is the smallest, being only 16½ inches in length. It is supposed that the incised lines, which are sharply defined and deeply cut, contained a black enamel, but no traces of it now remain. The circular cavities in the surrounding bead at the tips were also intended for the reception of enamel, probably of some brilliant colour. These designs, which belong to the so-called "late Celtic" style of ornamentation, when so treated must have had a striking effect on the bright bronze surface.

In Nos. 1 and 4 it will be observed that there is a transverse raised band, the purpose of which was, no doubt, to strengthen the sheath. Such bands were a feature in the La Tène sheaths, which in some instances were repeated several times at intervals on the body of the sheath. In Canon Grainger's collection I saw one or two broad rings compressed in the middle, which I took to be the cross-bands of other sheaths.

Swords.—The swords which belonged to these sheaths were all of iron, a fact which probably accounts for their being in a more dilapidated condition. Of four recovered up to this date only one is in a good and perfect condition (**Fig. 124**, No. 1). Its total length is 19½ inches, of which the handle takes up five inches, measuring from the extremity of the tang to the nearest part of the curved ridge which separates it from the blade. The blade has a sharply defined ridge and tapers gracefully to a point. The other swords are all fragmentary. One, as already mentioned, is still in its sheath; another, portion of a blade 14 inches long, has a sharp central ridge and otherwise corresponds exactly with the entire weapon. Of the fourth there remains merely the handle (No. 2), the blade having apparently disappeared by oxidation. So far it also closely corresponds with the entire weapon. Both

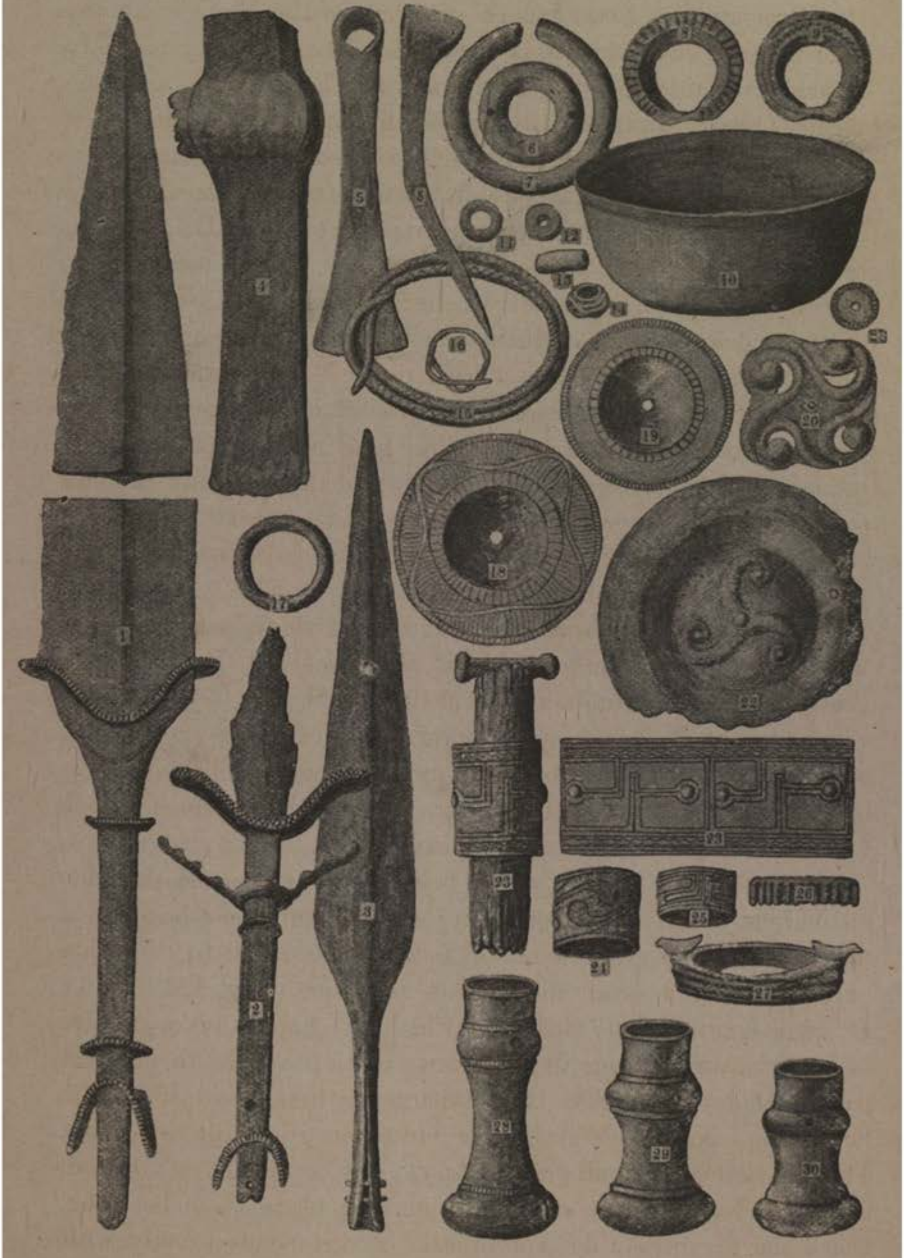
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Fig. 124.—Lisnacroghera. Iron Weapons, etc. Nos. 4, 5, and 10 = $\frac{1}{4}$, the rest = $\frac{1}{2}$ real size.

handles have bronze mountings, which, though differing in some details, are so peculiar in their plan and method of execution, that we have no hesitation in recognising them as belonging to one and the same group—a group which, so far as my knowledge goes, finds its parallel only in a few examples from La Tène. (See **Fig. 87**, Nos. 7 and 8.) As to the material of which the grip was made there is no evidence. The bronze circlets and flanges on the tangs, if in their original position, involve the necessity of having the handles, whether of bone or horn, divided in several pieces. That these bronze sheaths and iron swords were counterparts of each other there can be no reasonable doubt. Their points of agreement, besides general dimensions and style of manufacture, are too remarkable to be accidental. Thus the peculiar curve at the opening of the sheaths fits that of the band of separation between the handle and blade of the swords. Also the prominent midribs in the two sword-blades have corresponding prominences in two of the sheaths (Nos. 3 and 4).

Lances.—Though there is only one spear-head in the Lisnacroghera collection, there is ample evidence to show that it was not an isolated example of this kind of weapon. Certain objects, like the brass knob of a door (Nos. 28, 29, and 30), amounting in all to seven or eight, are now known to have adorned the butt end of the wooden handles of so many spears. One of these handles, 8 feet in length, though now greatly shrunk and contorted, is still preserved by Canon Grainger and conclusively proved their use as well as that of some other objects which previously seemed equally mysterious. At the other end of the spear-shaft, close to where it entered the socket, was a ferrule of the same style of art as the sword-sheaths (Nos. 23, 24, and 25). Several of these ferrules have been found which, like the ornaments on the butt end, differ considerably in regard to size. They are all ornamented with elegant designs in incised lines which also, it is supposed, contained enamel. One is here represented with a piece of the handle and a bronze rivet (No. 23), probably that which fixed the spear more firmly in its shaft; but of the spear itself nothing remains. The only spear-head that has been found is of iron. It is a magnificent blade 16½ inches in length, with a slim socket containing two rivets (No. 3).

A curious object here represented as No. 27 consists of an oval ring, "richly decorated with bands, in which are remains of white and red enamelled designs in a chevron or wavy pattern." On one edge there are two forms like that of a bird. Mr. Wakeman considers it to be the terminal ornament or pommel to a sword or dagger. (B. 411, p. 391.)

Various Bronze Mountings.—Among the other objects which from their character and style of art belonged to the same group as we have just described are the following:—(*a*) Two ornaments of thin bronze in repoussé. One is a disc (No. 22), slightly impaired at the margin, bearing in the centre a triquetrum of symmetrical spirals, and surrounded by a slightly raised border. The other (No. 20) is in a more fragmentary condition, but sufficient remains to show the design to be a *swastika* or *croix gammée*, worked after the same fashion as the former and probably serving as the central ornament of a disc. (*b*) Three cup-shaped ornaments each having a small aperture in the centre. One (No. 18) is surrounded by a broad margin like a wide-awake hat, which is copiously ornamented with incised lines. On the supposition that this was intended to adorn the face of a wooden shield the cup must have been embedded in the wood, as it is clear that its concave side is the front, there being no ornamentation on the other. Another of the same kind is represented by No. 19, and differs from the former only by having a smaller and less decorated border. In a third specimen the ornamented border entirely disappears, and its place is taken by a marginal bead. (*d*) A variety of annular and penannular rings, some hollow (Nos. 6 and 7) and others solid (No. 17). Some, as Nos. 8 and 9, are ornamented with designs (one of which still retains an enamel of a vermilion tint) and were probably attached to pins and used as ring-brooches. A curious object like a doubly coiled bangle with the coils adherent and ornamented with zig-zag lines is supposed to have been the rim of an oval brooch (No. 15). (*e*) A plain but elegantly shaped drinking-cup of thin bronze (No. 10) has neither handle nor any marks of rivets. (*f*) Among minor things are a couple of bronze pins, one with a round top and the other with a small ring; also a rude finger ring (No. 16), an ornamental stud (No. 21), and a rivet with one side deeply serrated like a cog-wheel (No. 26).

In addition to the above list of objects, all of which may be considered as part of one special and indeed unique group which by some chance found their way into the Lisnacroghera crannog, there are others similar to the usual class of crannog relics; and among these I have noted the following:—

Iron.—Two large iron cauldrons in a fragmentary state; a large curved knife, like that of a hedge-cutter, still retaining its wooden handle; an axe (No. 4), also containing a portion of the handle; an adze (No. 5); a reaping hook; portion of a gunlock, together with various bits of an undefined character.

Beads.—Several coloured and variegated beads (blue, red, and white) (Nos. 11, 12, and 14). One bead is of stone, another large one is of jet, and another of amber (No. 13).

Stone.—One small stone axe of a dark colour and wedge-shaped, some elongated four-sided hones, hammer-stones, etc.; a few flint flakes, and rude arrow-points.

Pottery.—A few fragments of coarse earthenware, indicating large wide-mouthed vessels.

Miscellaneous.—A portion of "bog-butter" bearing the impression of a coarse cloth. Several pieces of wood with round and square-cut holes.

LOUGH MOURNE.

In consequence of the partial drainage of Lough Mourne during the summer of 1882, while its basin was being converted into a reservoir for the supply of water to the town of Belfast, two artificial islands became exposed which were at once recognised to be the remains of submerged lake-dwellings. Shortly after exposure I visited them in company with Mr. Robinson, the assistant engineer to the Belfast waterworks, and subsequently recorded my observations in the Proceedings of the Society of Antiquaries of Scotland (B. 439), of which the following is a short abstract.

The first, which was easily accessible on foot, was very much disturbed by the repeated "howkings" of visitors. Its form, as determined by the area containing the stumps of piles, was irregularly circular, but nowhere exceeding 60 feet in diameter. Included within this area were four small separate elevations, composed of a few stones, clay, and ashes interspersed with burnt twigs and bits of charcoal. None of these elevations had as large a diameter as 10 feet, and it only required one turn over of the spade to reach the undisturbed bed of the lake. Digging on these so-called islets, and in the spaces around them, I found stumps of upright piles and fragments of burnt faggots, the latter forming a thin layer over the true lake-sediment. The piles were closely set, about one or one and a half foot apart, and uniformly occupied the whole area of the dwelling without any appearance of circular stockades; nor was there any semblance of a fascine-structure indicating an artificially constructed island. From the margin or outskirts of the area occupied by these piles a double row of stumps extended towards the shore, which, on being traced, were found to have stopped half way to the ordinary water-level mark. The conclusion which I came to was that this lacustrine dwelling was a true palafitte, over whose wooden platform two or three hearths were constructed of incombustible materials, as stone and clay. Probably these hearths would have been surrounded by some kind of huts. During the conflagration which had destroyed the entire wooden structures (of which final catastrophe there appeared little doubt from the amount of burnt faggots and beams that lay scattered over the lake bed all over the area containing piles), the materials of these hearths would ultimately drop down to the bottom of the lake, still, however, retaining their relative position, and so present the appearance of low mounds over the bed of the lake with the stumps of their supporting piles penetrating them.

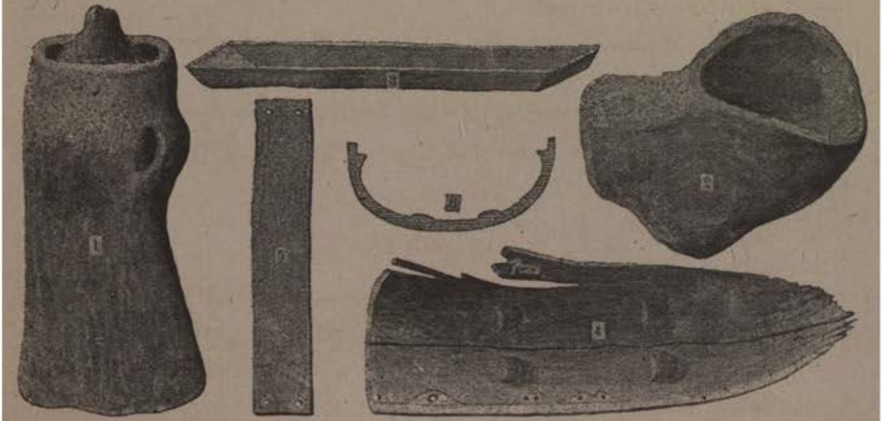

Fig. 125.—LOUGH MOURNE. No. 1 = ¼, and 2 = ½ real size.

Among the relics recorded from this lake-dwelling are "two small stone crucibles" (B. 320), an iron hatchet, part of a canoe, a hammer-stone, a rubbing-stone, two small urns (?), part of a large crucible, charred bones, teeth, shells of hazel-nuts. (B. 439, p. 324.) Flint flakes, scrapers, and arrow-points have been found in the vicinity along the shore, but on the crannog itself only a quantity of fine chips was discovered. Some of these relics I saw in the possession of a young man of the name of Macdonald, who lived in the neighbourhood and took an active part in searching for relics. The iron hatchet turned out to be of exceptional interest. It is a socketed celt, with a loop at one side for fixing the handle, part of which was still remaining in the socket. (**Fig. 125**, No. 1.) Bronze celts of this description are, of course, very common, but specimens made of iron are extremely rare, especially in the British Isles, and only exceptionally to be seen in the museums of Europe. This is the only one hitherto recorded from a British lake-dwelling, and, moreover, it is, as regards size and form, quite unique. It measures 6¾ inches long and 3¼ inches broad immediately above the cutting edge. The longest diameter of the socket is 2½ inches, and this breadth is continued for about two-thirds of its length, except where the loophole causes it to bulge outwards.

One of the crucibles, which I believe is now presented to the Belfast Museum, is rather peculiar in having a short projecting handle (No. 2).

It would thus appear that the inhabitants of this lake-dwelling practised the art of metallurgy, which would entail at least one fire-proof furnace, and thus partly account for the existence of so many hearths on such a small area.

The second dwelling was about 150 yards from the shore, in deep water, and lying over a great depth of quaking mud. It was a small example of the ordinary stockaded island, but owing to the softness of the mud and oozing of water no satisfactory investigation could be undertaken. Mr. Robinson calculates the extent of its submergence at 15 feet. Its entire surface was occupied by a heap of stones which gave it the appearance of a hillside cairn. Digging underneath these stones we came upon a thick bed of heather and brackens interspersed with beams and brushwood. Near the margin were to be seen a few piles and beams rudely mortised, from which one or two long beams radiated towards the centre like the spokes of a wheel.

In the first described lake-dwelling no submergence could have taken place, as the lake bottom was composed of compact sand in which the piles had a firm hold.

In different parts of the lake two single-tree canoes were found embedded in the mud, both of which are now preserved in the Belfast Museum. One is a plain trough of a rectangular shape with slightly sloping sides, measuring 12½ feet long, 2½ wide and 9 inches deep (No. 3). Its flat base is perforated with six circular holes ¾ inch in diameter. The other is pointed at both ends, and altogether much more artistic in its structure. It was originally about 13 feet long and 3½ feet wide, but the fore-part is considerably damaged. The stern portion is here figured (No. 4). It had two seats formed of neat planks of oak, seven inches broad, and supported on projecting ledges on each side cut out of the solid, as shown in the section No. 6. The seats (No. 5) were kept in position by two wooden pins at each end which penetrated into the solid supports. For the oars there were also two arrangements on each side consisting of perforated projections left out of the solid as shown on the margin of the portion here sketched. But the most remarkable feature of this canoe consists of four prominences with abrupt edges (also left in the solid) for the feet of the rowers, as seen in the illustration. The distances from the centre of the seats to their corresponding foot marks were 33 and 34 inches respectively.

LIST OF IRISH CRANNOGS ALPHABETICALLY ARRANGED, WITH NOTES AND REFERENCES.

Aconnick Lough, co. Cavan. B. 13, Ap. p. 43.
Acrussel Lough, co. Fermanagh. B. 444, p. 187.
Allen Lough, co. Leitrim. B. 9, p. 45.
[1] Aghakilconnel Lough, co. Leitrim. B. 13, Ap. p. 43.
Aghnamullen ("Glebe Island"), co. Monaghan. B. 93b, p. 229.
[2] Annagh Lough, two crannogs, between King and Queen's County. B. 149, p. 154.
Annagh, parish of Kilbarron, co. Tipperary. B. 444, p. 212.
Ardakillen, four crannogs. B. 13, p. 208, and Ap. p. 48; B. 18, p. 230.
[3] Ardmore Bay, submarine crannog, co. Waterford. B. 329, p. 61, and B. 330, p. 154.

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[1] Three iron pots were found on this crannog, one of them being of a triangular shape.

[2] Various mediæval objects collected in the mud on and near the crannog sites: iron cuirass, matchlock guns, pistols, antique keys, spurs, implements of iron, bronze ladle, bronze spear-head. The swords and gun-barrels were found sticking up in the mud from the lake-bottom.

[3] A great many piles covering an oval enclosure about 100 feet in diameter. On submarine crannogs, see Kinahan's "Manual of the Geology of Ireland," p. 264, and Note 83 (p. 443) of Scottish list of crannogs.

Arrow Lough, co. Sligo, several stone islands near the Abbey of Ballindoon. B. 444, p. 245.

Aughlish, about five miles from Enniskillen, co. Fermanagh. B. 217, pp. 323.

Ballaghmore, co. Fermanagh. B. 217, p. 322.

Ballinafad, co. Galway. B. 214, p. 12.

[1] Ballinahinch, co. Galway. B. 214, p. 12.

Ballinderry, near Moate, co. Westmeath. B. 391, p. 196.

Ballinlough, four crannogs, co. Galway. B. 70a.

Ballydoolough, five miles from Enniskillen, co. Fermanagh. B. 191, pp. 360 and 569, and B. 217, p. 314.

Ballygawley Lake, co. Sligo. B. 444, p. 246.

[2] Ballyhoe Lough, two crannogs, near Carrickmacross, co. Monaghan. B. 13, p. 417, and B. 135, p. 8.

Ballykinler, co. Down. B. 29, p. 86.

Ballylough Baile-an-Locha. "Annals of the Four Masters," B. 27, p. 193, and B, 438, p. 168.

Ballywoolen, co. Down. B. 29, p. 86.

Bohermeen, co. Meath. B. 444, p. 82.

Bola Lough, co. Galway, lake stone-dwelling. B. 214, p. 11.

[3] Breagho, co. Fermanagh. B. 217, p. 322.

Camlough, co. Armagh. B. 444, p. 178.

[4] Cargaghoge, Barony of Farney, co. Monaghan. B. 162, p. 269, and vol. v., 4th S., p. 330.

Castleforbes, co. Longford. B. 24, p. 150.

Castlefore Lough, two crannogs, co. Leitrim. B. 13, Ap. p. 43; B. 438, p. 409.

Clogherny, co. Tyrone. B. 119, 2nd ed., p. 649.

[5] Cloncorick Castle L., co. Leitrim. B. 440, p. 408.

Cloneygonnell L. (Tonymore), three crannogs, co. Cavan. B. 60.

Cloonbo L., two crannogs, co. Leitrim. B. 13, Ap. p. 43.

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[1] O'Flahertie in his history mentions that the ancient castle of the O'Flaherties of Bunowen, in Ballinahinch Lake, was built on an artificial island.

[2] Two crannogs, one large and the other small. The former is only separated from the mainland by a shallow channel, and is accessible in summer by a narrow causeway. On it were found "two fine specimens of bronze pins, besides other articles of less interest in lead and iron, and a flint spear-head."

[3] A stockaded enclosure, about 35 feet in diameter, lying some 12 or 14 feet below the bog surface. "A magnificent pair of quern stones" and a large bowl-shaped vessel of oak are known to have been found on it.

[4] A curious wooden flooring, buried 14 feet in the bog. It rested on "a thick deposit of hazel and birch branches." Over it was a "collection of stone slabs, closely fitted together with a substratum of blue clay, but all laid on planks of timber forming part of the floor. On this there were quantities of ashes, proving that this was the fire-place of the ancient dwelling."

[5] "With piles round the margin and amongst the stones on its surface were found querns, some perfect, some in a broken state." A canoe became visible at a depth of 2½ to 3 feet when the water of the lake was unusually low

Cloonboniagh L., co. Leitrim. B. 13, Ap. p. 43, and B. 438, p. 408.
Cloonfinnen L., co. Leitrim. *Ibid.*, and B. 438, p. 408.
Cloonfinlough, two crannogs, co. Roscommon. B. 13, p. 208, and Ap. p. 40.
Cloonfree, two crannogs. *Ibid.*, p. 219, and Ap. p. 48.
Cloonturk L., two crannogs, co. Leitrim. *Ibid.*, Ap. p. 43.
[1] Cloughwater Bog, near Ballymena, co. Antrim. B. 148, p. 21.
Coal Bog (Kilnamaddo), near Boho, co. Fermanagh. *Jour. Arch. Association*, xxxvi. p. 271 ; B. 345, p. 66.
Coolcranoge, co. Limerick. B. 444, p. 28.
Corcreevy (Loch-Laoghaire) co. Tyrone. "Annals of the Four Masters," B. 13, p. 215.
Corrib L., a few lake stone-dwellings, co. Galway. B. 214, p.11.
[2] Cornagall L., co. Cavan. B. 191a, p. 461.
[3] Cornaseer, co. Cavan. B. 438, p. 148.
Craigywarren, co. Antrim. B. 444, p. 110.
Crannagh MacKnavin, co. Leitrim. B. 18, p. 233.
Crannagh Lough, co. Antrim. B. 24, p. 157.
Crannog-na-n-Duini, co. Donegal. B. 18, p. 233.
Crannog-boy, parish of Inishkeel, co. Donegal. B. 444, p. 28.
Crannog Mac Samhradhain, co. Cavan. "Annals of the Four Masters." B. 9, p. 45.
Creenagh L., two crannogs, co. Leitrim. B. 438, p. 408.
Cullina, near Maryborough, Queen's County. B. 444, p. 210.
[4] Currygrane L., two crannogs, co. Longford. B. 443, p. 410.
Derreen L., co. Roscommon. B. 13, Ap. p. 62.
Derreskit L., co. Cavan. B. 13, Ap. p. 43.
Drumaleague L., two crannogs, co. Leitrim. B. 18 ; B. 13, Ap. p. 43.
Drumdarragh or Trillick, co. Fermanagh. B. 441 ; B. 217, p. 324.

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[1] A small crannog discovered by turf-cutters, and "interesting from the fact of instruments made of iron and stone having been found together." Among other things were a bronze pin, fragments of crucibles, bits of anthracite coal, a socketed iron implement, two small flint knives, a stone celt, a round flat stone with an oblong-worked indentation on each side, and several bits of rude pottery.

[2] An artificial island, 30 yards in diameter, thickly planted with timber and surrounded with piles. In 1870 a canoe was found on the shore of this islet, embedded in the mud and half destroyed by fire. In the stuff lying on its floor were found some iron tools—an adze, a hammer (both with handles), a socketed chisel, two whetstones, and some fragments of iron.

[3] A small lake, scarcely a mile in circumference, and about three miles from Cavan. About a hundred yards from shore a heap of stones, surrounded by circles of stockades about fifty feet in diameter. In the moss near the lake two canoes were found 21 and 18 feet long.

[4] This lake is in the parish of Clonbroney, and contains two crannogs, called "Round Island" and "Fry's Island." The former is 18½ yards in diameter, and the "wooden piles, though in a pulpy and rotten state, are still to be seen. In the lake a small canoe, 9½ feet long, an iron spear, the nether stone of a grain-rubber, and the antlers (with eighteen points) of a deer were found embedded in the silt."

[1] Drumgay, three crannogs and one stone-island, co. Fermanagh. B. 189, p. 232, and B. 217, p. 314.
[2] Drumkeery L., near Bailieborough, co. Cavan, B. 57, p. 483.
[3] Drumkelin, parish of Inver, co. Donegal. B. 3, p. 361.
[4] Drumlane, eight miles from Cavan, two crannogs, co. Cavan. B. 438, p. 149.
Drumskimly, three crannogs, co. Fermanagh. B. 189, p. 583, and B. 217, p. 320.
[5] Drumsloe, co. Fermanagh. B. 217, p. 321.
Effernan, co. Clare. B. 346, p. 336.
Eyes Lough, six crannogs, co. Fermanagh. B. 189, p. 553 and B. 217, p. 317.
Faughan L., co. Down. B. 24 and 25; B. 18, p. 158.
Fort L., co. Donegal. B. 444, p. 181.
Funshinagh L., co. Leitrim. B. 13, Ap. p. 43.
Galbally, co. Tyrone. B. 217, p. 197.
Glencar L., five crannogs, co. Sligo and Leitrim. B. 444, p. 243.
Gortalough, co. Fermanagh. B. 346, p. 336.
Grantstown, co. Queen. B. 93, p. 228.
Guile L., co. Antrim. B. 148, p. 20.
Gur L., co. Limerick. Evans' "Ancient Bronze Implements, etc.," p. 436; B. 18, p. 223.
Hackett Lough (L. Cimbe), co. Galway. "Annals of Lough Cé," 1067; B. 119, 2nd ed., p. 654; B. 18, p. 230.
Hilbert L., Goromna Island, a lake stone-dwelling, co. Galway. B. 214.
Inishrush (Green Lough), co. Derry. B. 25, p. 212.

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[1] This is a small lake, three and a half miles north of Enniskillen, about a mile in length and half a mile in breadth. It contains three crannogs, the largest of which is 105 feet in diameter. "Here were found querns, whetstones, worked pieces of deer-horn, some fragments of iron plated with bronze, many pieces of ornamented pottery, some of which were furnished with ears or handles; a very curious stone (apparently a tombstone), sculptured with a cross and ornamented with four human heads, and scroll work, and a large boulder, upon which a cross-like figure had been picked or punched out."

[2] A large crannog, covering about an acre, but only partly artificial. About thirty thousand piles used in strengthening the island, which had a jetty, and near this a canoe was found. The principal relics are—some stone hammers, three pieces of flint scrapers, a bead of amber and another of glass, a small stone ring the size of a finger-ring, fragments of pottery, a crucible, some articles of brass, and portions of bog-ore. The piles were cut by very sharp metal implements.

[3] In 1833 Captain W. Mudge, R.N., discovered here a wooden hut made of a framework of large oak beams mortised at the four corners. It measured 12 feet square and 9 feet high, and about half way up there was a flooring which divided the space into two storeys. The roof of this unique hut was buried in the peat 16 feet from the surface, and its base rested on a substratum of brushwood resembling a crannog. (See p. 489).

[4] Two crannogs, one large, 100 feet in diameter. An iron cauldron, found near the shore of lake, made on the same principle as the usual bronze cauldrons, of beaten iron, and riveted.

[5] Ornamented quern stone found on the crannog.

Joristown, in the river Deal, co. Westmeath. B. 13, Ap. p. 55, and B. 444, p. 205.

Kilglass L. B. 13, Ap., p. 48.

Killynure, near Enniskillen, co. Fermanagh. B. 217, p. 323.

Kilmore L., two crannogs, co. Monaghan. B. 13, Ap. p. 43.

Kilknock L., co. Antrim. B. 24, p. 153.

Knockany (Lough Cend), co. Limerick. B. 444, p. 156.

Lagore, or Dunshaughlin, co. Meath. B. 175, p. 462; B. 14, p. 35; B. 18; B. 4, p. 425; B. 10, p. 101.

Lane L., co. Roscommon. *Cal. State Papers Ireland*, vol. 156, p. 374.

Lankhill, near Enniskillen, co. Fermanagh. B. 441, p. 372.

Leesborough L., co. Monaghan. B. 13, p. 43.

Lenaghan, co. Fermanagh. B. 444, p. 188.

Lisanisk, co. Monaghan. "The island Ever McCooley's house"; B. 18, p. 231; B. 9, p. 46, and B. 8, p. 94.

Lisnacroghera, near Broughshane, co. Antrim. B. 411.

Lochanacrannog, co. Sligo. B. 444, p. 246.

[1] Loughran's Island ("Innis-an-Lochan"), in the river Bann, near Coleraine, co. Antrim. B. 13, p. 417; B. 27, p. 192.

Loughannaderriga, Achille Island, co. Mayo. B. 444, p. 230.

Loughinsholin, co. Derry. B. 18, p. 233; B. 25, p. 157.

Loughavarra, co. Antrim. *Ulster J. Arch.*, vol. vii. p. 192; "Annals of the Four Masters," 1544.

Loughavilly, co. Fermanagh. B. 217, p. 321; B. 346, p. 332.

[2] Lochlea, three crannogs, co. Roscommon. B. 13, Ap. pp. 48 and 61; B. 18, p. 29.

Lough-na-Glack, co. Monaghan. B. 9, p. 46.

Lough Cam, lake stone-dwelling, co. Galway. B. 214, p. 12.

Loughmagarry, co. Antrim. B. 24, p. 156.

[3] Loughtamend ("Loughtoman"), co. Antrim. *Ibid.*, p. 155.

Loughtown, co. Leitrim. B. 13, Ap. 43.

Loughrea, four crannogs, co. Galway, B. 58, p. 412.

Lough Oughter, three or more crannogs, co. Cavan. B. 438, p. 151.

Lynch Lough ("Loch-Leith-innsi"), co. Antrim. B. 27, p. 193.

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[1] "Six stone and two bronze celts, an iron spear-head and a bayonet, three fibulæ, one bridle-bit and two cheek-plates made of bronze," found on this island.

[2] From this crannog the following objects were presented to the Museum of the Royal Irish Academy:—"A piece of circular grindstone, block of flint, old iron key, two portions of blades of iron swords, and a piece of bone spike."

[3] A well-defined stockade, with horizontal beams. A canoe and the following objects recorded from this crannog:—"Two iron swords; a small anvil, very bright and clean; a pair of scales and several hammers; several gold pins; metal dishes; small axe-heads; an iron cauldron of a low dilated shape; a stone of yellowish-white colour, beautifully polished, about twelve inches long, three and a half broad, and two thick, accurately squared at the sides, having a round hole about one and a quarter inch deep and half inch in diameter at each end, the top surface and one of the sides being covered with carved devices; and a quern."

Mac Hugh L., two crannogs, co. Leitrim. B. 13, Ap. p. 43, and B. 440, p. 408.

Macnean L., three crannogs, co. Fermanagh. B. 217, p. 323.

Mac Nevin (Mac Cnaimhain) crannog, co. Galway. B. 70, p. 176.

Manorhamilton, co. Leitrim. B. 25, p. 346, and B. 18, p. 552.

Marlacoo, co. Armagh. *R. H. A. A.*, vol. vi., 4th S., p. 432.

Mask L., Hag's Castle, lake stone-dwelling. B. 214, p. 11.

Melvin L. (Melge), between co. Fermanagh and Leitrim. "Annals of the Four Masters"; B. 18, p. 231, and B. 13, p. 215.

Moinenoe, co. Fermanagh. B. 217, p. 322.

Monaincha, co. Tipperary. B. 444, p. 212.

Monalty, half a mile from Carrickmacross, co. Monaghan. B. 8, p. 94, and B. 9, p. 46.

Monea, co. Fermanagh. B. 217, p. 318.

Mongavlin, co. Donegal. "Annals of Lough Cé"; B. 444, p. 151.

Monnachin L., co. Monaghan. *Ibid.*, p. 151.

Mourne L., two crannogs, co. Antrim. B. 390, pp. 194 and 371, and B. 439, p. 321.

Moynagh L., co. Meath. Notes by Col. Wood-Martin.

Muickeanagh L. (Lough Leisi), co. Roscommon. B. 18, p. 230.

Mucknoe L., co. Monaghan. B. 444, p. 151.

Muintir Eolais, co. Leitrim. "Annals of the Four Masters"; B. 18, p. 231; B. 9, p. 45.

Nahinch L., Tipperary and King's County. B. 70b; Wakefield's "Ireland," vol. i. p. 94.

Naneevin L., co. Galway. B. 118, p. 31.

Ooney L. ("Loch-n-Uithne"), co. Monaghan. "Annals of Lough Cé"; B. 444, p. 156.

Owel L., co. Westmeath. *Pro. R. I. A.*, vol. ix. p. 210.

Pad or Boat L., near Lough Eyes, co. Fermanagh. B. 217, p. 318.

Ravel L., "Derryhollow," "Aghaloughan," near Randalstown, co. Antrim. B. 24 and 25; B. 148, p. 22; B. 215, pp. 74 and 194; *Kilk. A. S.*, 2nd S., vols. iii. p. 88, and iv. p. 36.

[1] Rahan's L., near Carrickmacross, co. Monaghan. *K. A. S.*, vol. iv., 2nd S., p. 379.

Ramor L., co. Cavan. B. 438, p. 152.

[2] Rinn L., three or four crannogs, co. Leitrim. B. 24, p. 147; B. 440, p. 408.

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[1] "In another crannog in Rahan's Lake," says Mr. Morant, "we found five Queen Mary shillings, fused into a mass; a bronze pin; a flat spear-head, and a stone celt. We also found the hearthstones and a quantity of ashes. The piles around the island are still visible above the water."

[2] Contained three or four crannogs. "In the one opposite Cloncahir were found several querns of different sizes and patterns (chiefly flat-shaped, ornamented with the usual cross design, varied more or less), and many of these were taken away by Mr. Kane to preserve at Mohill Castle. When the water was at a low level a slight

Ross L., near Crossmaglen, co. Armagh. *J. R. H. A. As.*, vol. vi., 4th S., p. 432.

Roughan L., near Dungannon, co. Tyrone. B. 438, p. 152.

Rouskey L., co. Monaghan. B. 444, p. 151.

Scur L., two crannogs, co. Leitrim. "Annals of Lough Cé," 1345, 1390, and 1580; B. 13, Ap. p. 43. B. 18, p. 223.

[1] St. John's Lough, four crannogs, co. Leitrim. B. 13, Ap., pp. 43 and 59.

Talogh L., at Feenagh, several crannogs, co. Leitrim. B. 440, p. 408.

The Miracles, co. Fermanagh. B. 217, p. 319, and B. 346, p. 331.

Toome Bar, co. Antrim. B. 92, p. 227.

[2] Tully L., three crannogs, co. Cavan. B. 438, p. 150.

Tullyline, co. Cavan. B. 13, p. 215.

Veagh L., co. Donegal. "Annals," B. 18, p. 231.

Yoan L., co. Fermanagh. B. 217, p. 324.

examination was made in regard to the construction of the crannog. It was found that there were two, possibly three, concentric circles of piles of small size, enclosing an area considerably larger than that of the present island, and the space so enclosed seemed to have been filled with rough unhewn logs of wood up to about the present summer level of the water. Upon this had been deposited a stratum of stones and gravel, amongst which were found the querns already mentioned. In the same lake are three other crannogs—Man Island, Crane Island, and another."

[1] Three silver coins of the reigns of Edward I., II., and III. found on this crannog.

[2] Three crannogs in this loch, two close to each other, and are approached by a causeway which terminates about sixteen feet from the crannogs, both about twenty-five feet in diameter. On the margin of this crannog, under water, a bronze spear-head was found, 5¾ inches long, and a looped celt 4 inches long.

II.—SCOTTISH LAKE-DWELLINGS OR CRANNOGS.

It was not till after the discoveries on the Continent had attracted universal attention that archæologists began to look for similar remains in Britain. It was then found that early historic references to island forts, and some incidental notices of the exposure of buried islands artificially constructed of wood and stone, and other remains of lacustrine abodes, during the drainage of lochs and marshes in the last and early part of this century, had been entirely overlooked. The merit of correctly interpreting these remains in Scotland, and bringing them systematically before antiquaries, belongs to the late Joseph Robertson, Esq., F.S.A., Scotland, who read a paper on the subject to the Society of Antiquaries of Scotland on the 14th of December, 1857, entitled, "Notices of the Isle of the Loch of Banchory, the Isle of Loch Canmor, and other Scottish examples of the artificial or stockaded islands, called crannogs in Ireland, and Keltischen Pfahlbauten in Switzerland."

Mr. Robertson's paper, though not published, at once attracted attention, and stimulated so much further inquiry on the part of the members, that, at the very next meeting of the Society, another contribution on the subject was read by Mr. John Mackinlay, F.S.A., Scotland (B. 21), from which it appeared that as early as 1812 this gentleman had observed some remains (now surmised to be a crannog) in Dhu Loch, in the island of Bute, which were described in a letter dated the 13th February, 1813. This communication found its way to George Chalmers, Esq., author of "Caledonia," regarding which, writing on the 26th of April, 1813, he says:—"It goes directly to illustrate some of the obscurest antiquities of Scotland. I mean the wooden castles, which belong to the Scottish period when stone and lime were not much used in building. I will make proper use of this discovery of Mr. Mackinlay." In 1863, Dr. John Grigor, of Nairn, described "two ancient lake-dwellings or crannoges in the Loch of the Clans, Nairnshire." (B. 55.) The remains, however, were too imperfect to be of value in illustrating their structure, and the only relics found were a portion of a small stone cup or lamp, two whetstones, an iron axe-head, and some charcoal and bits of bone.

A more important discovery, made about the same time, was a group of artificial islands in Loch Dowalton, Wigtownshire, which were first described by his Grace the Duke of Northumberland (then Lord Lovaine) in a paper read at the Newcastle-upon-Tyne meeting of the British Association in 1863. (B. 56.) About two years later Mr. John Stuart, Secretary to the Society of Antiquaries of Scotland, visited Dowalton, and, owing to a greater drainage of the loch having been made in the interval, was enabled to re-examine the Dowalton islands under more favourable circumstances. The result of his labours was an elaborate paper to the Society, in which he gave a detailed account of the structure and relics of these crannogs, and also took the opportunity of incorporating into his article all the facts he could glean, so as to afford a basis for comparing the Scottish examples with those in other countries. (B. 94.)

Since the publication of Dr. Stuart's paper in 1866, little progress was made in the investigation of Scottish crannogs, though traces of them were occasionally noticed in various parts of Scotland, till the discovery and examination of the Lochlee crannog, Ayrshire, in 1878-9. The work done at Lochlee was important, not only because of the varied collection of relics secured, but also on account of the interest it had excited in archæological research, the fruit of which has already been reaped by the discovery of no less than five other lake-dwellings in the south-west of Scotland, all of which have now been carefully investigated. Full details of these investigations are given in the Collections of the Ayrshire and Galloway Archæological Association, as well as in my recent work on the "Scottish Lake-Dwellings." (B. 331, 344, 373, and 426.)

While such general indications of lake-dwellings can hardly be said to limit their geographical distribution to any given area in Scotland, it is a singular fact that, so far as the discovery of actual remains illustrative of the civilisation and social condition of their occupiers is concerned, we are almost entirely dependent on the investigations made at Dowalton, Lochlee, Lochspouts, Buston, Airrieoulland, Barhapple, and Friar's Carse, all of which are situated within the counties of Ayr, Dumfries, and Wigtown. In instituting a comparison between the relics of these respective groups their resemblance is so wonderfully alike that we have no difficulty in dispensing with the necessity of discussing the merits of each group separately; so that whatever inferences can be legitimately derived from a critical examination of any one group may be safely applied to the whole.

As a preliminary to this inquiry the following details of the investigation of lake-dwellings in Scotland will, I trust, be sufficient to give general readers a tolerably correct notion of the social conditions and environments of the people whose history, solely from an archæological standpoint, it is our object here to pourtray.

DOWALTON.

The loch of Dowalton was of an irregular form, about 1½ mile long, and about three-quarters of a mile in greatest breadth, and without any marked outfall for drainage. Sir William Maxwell effected this by making a cut, 25 feet deep, through the wall of whinstone and slate which closed it in at its south-eastern boundary. When the waters were allowed to run off in the summer of 1863 no less than five artificially constructed islands became visible. One of these had a cairn of stones on it which always remained above water, and was known as the "Miller's Cairn," from the fact of its having been used, like the Nilometer, to measure the quantity of water in the lake, and thereby to regulate its supply to neighbouring mills. "On approaching the cairn," says Dr. Stuart, "the numerous rows of piles which surrounded it first attracted notice. These piles were formed of young oak-trees. Lying on the north-east were mortised frames of beams of oak, like hurdles, and, below these, round trees laid horizontally. In some cases the vertical piles were mortised into horizontal bars. Below them were layers of hazel and birch branches, and under these were masses of ferns, the whole mixed with large boulders, and penetrated by piles. Above all was a surface of stone and soil, which was several feet under water till the recent drainage took place. The hurdle frames were neatly mortised together, and were secured by pegs in the mortise holes. On one side of the island a round space of a few feet in size appeared, on which was a layer of white clay, browned and calcined as from the action of fire, and around it were bones of animals and ashes of wood. . . . . Lines of piles, apparently to support a causeway, led from it to the shore." (B. 94.)

The other islands were constructed in a similar manner, and of like materials. The largest and farthest from the shore measured twenty-three yards in diameter, and its surface was three feet lower than that of the others. Several canoes and bronze dishes were found in the mud in the vicinity of these islands, and in making excavations on them many relics and broken bones were collected, of which the following is a list as far as known up to the present time:—

RELICS FROM THE CRANNOGS IN LOCH DOWALTON.

Metal.—"Pot or patella of yellowish-coloured bronze (**Fig. 126**), with a handle springing from the upper edge, 7 inches in length, on which is stamped the letters P. CIPIPOLIBI. At the farther extremity is a circular opening. The bottom is ornamented with five projecting rings, and measures in diameter 6 inches; it is 8 inches in diameter across the mouth; the inside appears to be coated with tin, and has a series of incised lines at various distances. The vessel is ornamented on the outside opposite to the handle by a human face in relief, surrounded by a movable ring, which could be used in lifting the pot." (B. 94, p. 109.)

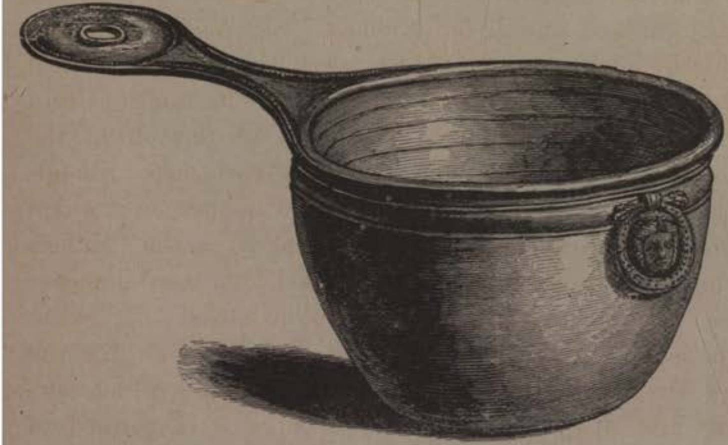

Fig. 126.—Bronze Dish (height, 5½ inches).

A bronze basin, measuring 10 inches in diameter and 4 inches in depth, shows several patches or mendings (**Fig. 127**). It is formed of several separate pieces of sheet-metal riveted together, and appears to have had an iron handle.

Two bronze dishes, hammered out of the solid. One measures 12 inches in diameter and 4 inches in depth. The other has the same diameter as the former, but is 1 inch less in depth, and has a turned-over rim 1 inch in breadth (**Fig. 128**).

A bronze ring, having attached to it a portion of the vessel of which it had been a handle (**Fig. 129**).

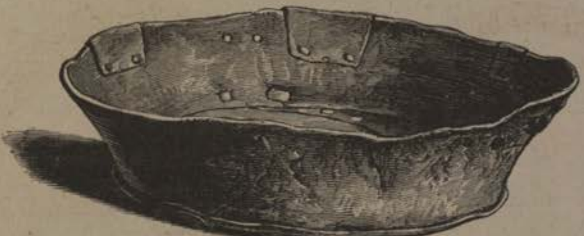

Fig. 127.—Bronze Dish, 10 inches in diameter.

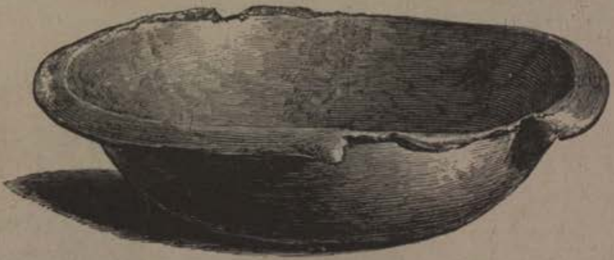

Fig. 128.—Bronze Dish, 12 inches in diameter.

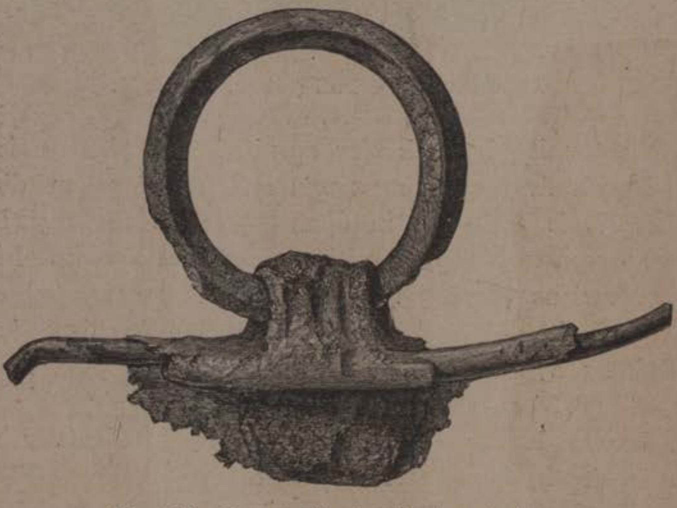

Fig. 129.—Bronze Ring-handle, ½ real size.

A penannular brooch and a circular ornament, with trumpet-shaped spaces, probably intended for enamel* (**Fig. 130**). Also a small ring, a fragment of bronze, and iron slag.

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* *Proc. S. A. Scot.*, vol. xv. p. 153.

Three iron hammers or axe-hammers (**Fig. 131**).

Glass.—Two beads of earthenware of a ribbed pattern, showing traces of a green glaze; one of vitreous paste of a whitish colour, with red spots; half of another bead of white

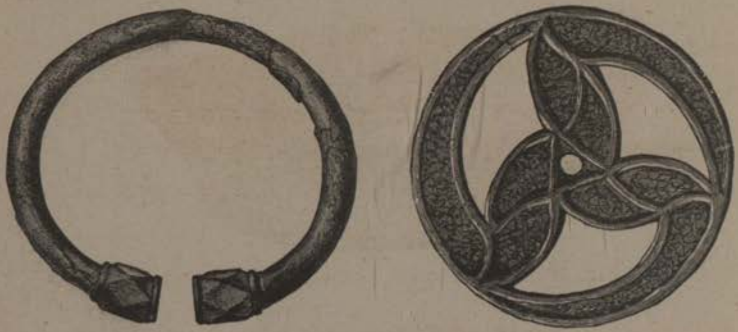


Fig. 130.—Bronze Brooch (1/1) and Bronze Ornament (2 inches in diameter).

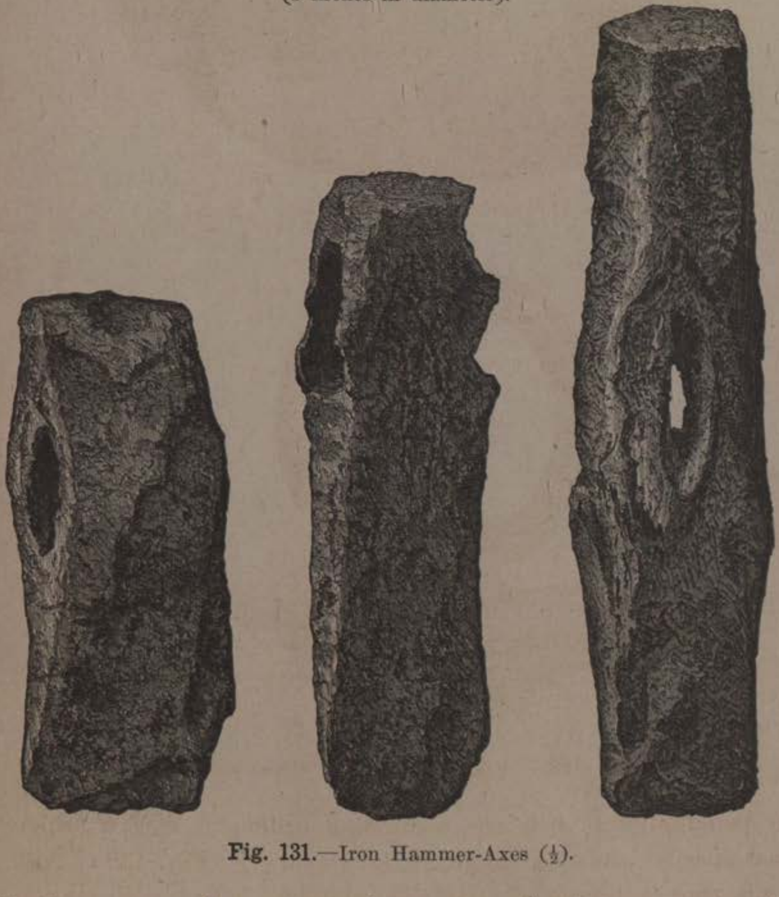
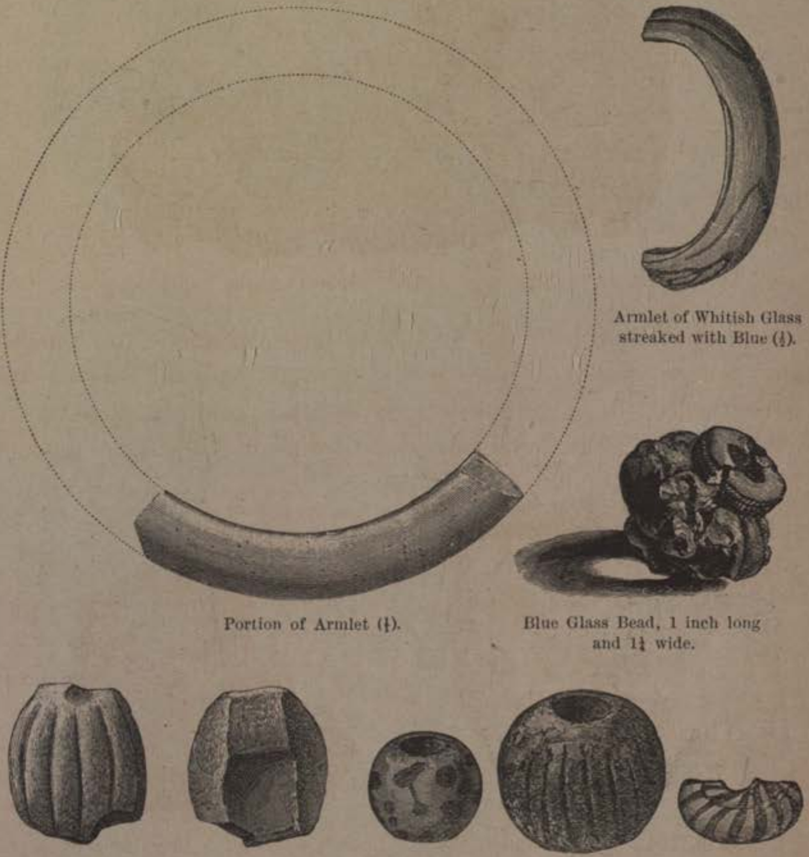


Fig. 131.—Iron Hammer-Axes (½).

glass, streaked with blue; and a large bead, 1¼ inch in diameter, of a somewhat remarkable character. The latter has in the central perforation a tube of bronze, and the edge of both sides of the perforation is ornamented by three minute bands of twisted yellow glass, while the body is of blue glass, of a ribbed pattern (**Fig. 132**).


Armlet of Whitish Glass streaked with Blue (½).

Portion of Armlet (½).

Blue Glass Bead, 1 inch long and 1¼ wide.

Beads all real size.

Fig. 132.—Objects of Glass or Vitreous Paste.

Several portions of armlets of glass. Half of one is of white glass, and streaked with blue. Others are of a yellowish or whitish colour (**Fig. 132**). A small portion of blue glass.

Leather.—Portion of a leather shoe, 7 inches in length, nearly covered with ornamental stamped patterns (**Fig. 133**).

Stone.—A thin flat stone, of a rectangular shape and highly polished, is supposed to have been used as a mirror; five querns, a flake of yellow flint, and several whetstones.

Wood.—Five canoes, measuring from 18 feet to 25 feet in length, and from 2 feet 7 inches to 4 feet 2 inches in breadth. Dr. Stuart describes one as being "25 feet in length, and strengthened by a projecting cross-band towards the centre, left in the solid in hollowing out the inside." A large wooden vessel, roughly cut out of the solid, and a portion of a bowl, with circular grooves made by means of a wood-turner's lathe.

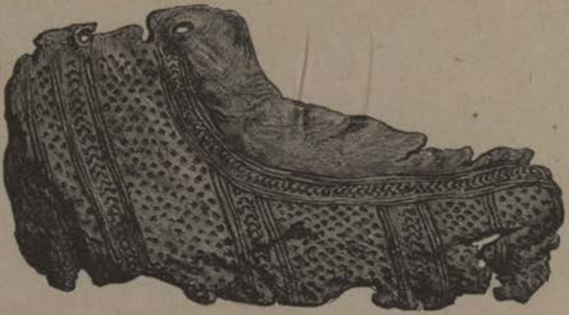


Fig. 133.—Portion of Leather Shoe (length, 7 inches).

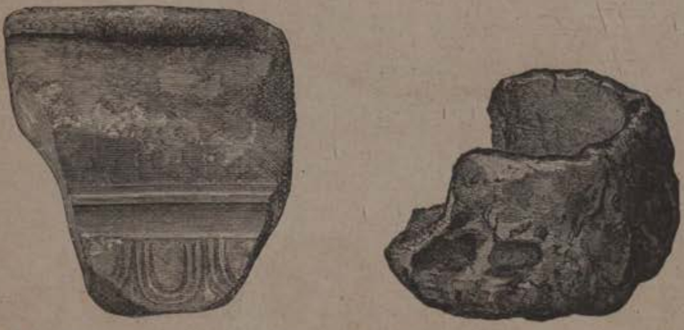


Fig. 134.—Bit of Samian Ware ($\frac{1}{1}$) and portion of a Crucible ($\frac{1}{2}$).

Pottery.—A small fragment of Samian ware and an earthen crucible (**Fig. 134**).

Miscellaneous.—A small shale ring, unfinished, a bead of amber, and a copper coin.

LOCHLEE.

The site of the Lochlee crannog was a small lake, which formerly occupied about nineteen acres of what is now, and has been for many years, arable land, on the farm of Lochlee, near Tarbolton.

Before it was artificially drained, some fifty years ago, no one appears to have surmised that a small island, which became visible in the summer-time, and formed a safe habitation for gulls and other sea-birds during their breeding season, had been formerly the residence of man; nor does it appear to have attracted the attention of the poet Burns, who lived on this farm for four years as ploughman to his father, then tenant of the place. The crannog was near the outlet of the lake, and the nearest land, its southern bank, was about seventy-five yards distant. When the first drainage of the lake was carried out, the wrought woodwork exposed in the drains running through the island, and especially the discovery of two canoes buried in the moss, attracted some attention. It was not, however, till 1878, in consequence of some discoveries during the re-drainage of the locality, that this most important crannog was investigated.

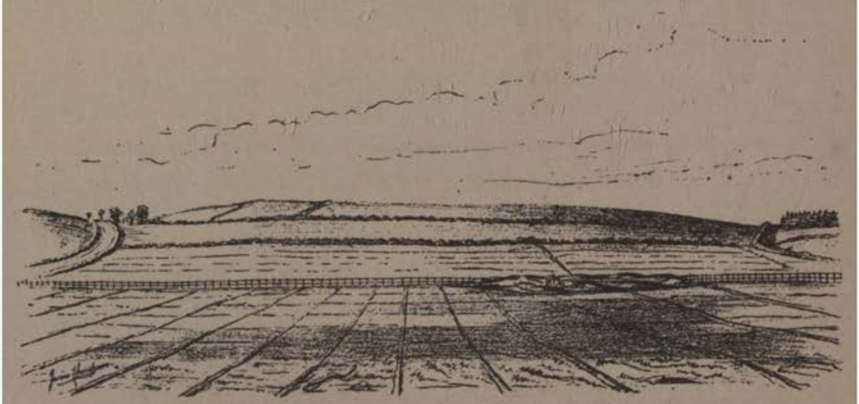


Fig. 135.—General View of Site of Lochlee Crannog.

The general appearance which it presented before the excavations were commenced, as seen in **Fig. 135**, was that of a grassy knoll, drier, firmer, and slightly more elevated than the surrounding field. Towards the margin of this mound were seen the tops of a few wooden piles, barely projecting above the grass, which at once suggested the idea that they might be portions of a stockaded island.

The diameter of the island was about one hundred feet; and its superficies was thus occupied:—In the centre was a flat circular area about sixty feet in diameter. Then followed a double line of upright piles from 2 to 3 feet apart. These were bound together by short transverse beams with a hole, generally square, at each end (**Fig. 136**), into which the tops of the uprights penetrated, while others stretched along the circumference forming a firm network. The surface of these horizontal binders was about three feet above the level of the inner area, and thus the stockade presented the appearance of a breastwork. At the north-east corner this arrangement was more perfect than elsewhere (see sketch, **Fig. 137**) and

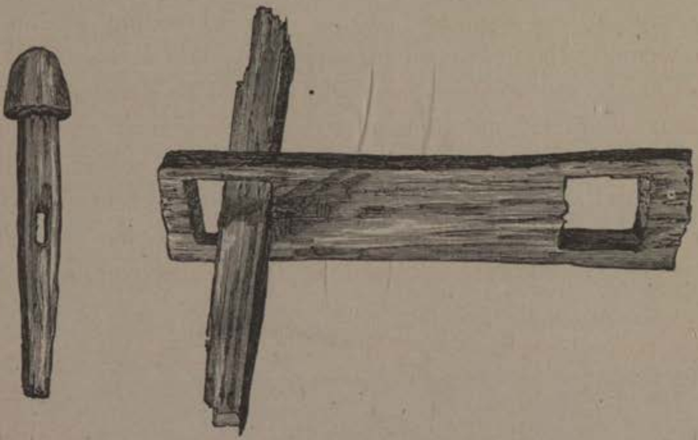


Fig. 136.—Mortised Beam with portion of an Upright ($\frac{1}{24}$) and a Wooden Peg ($\frac{1}{8}$).

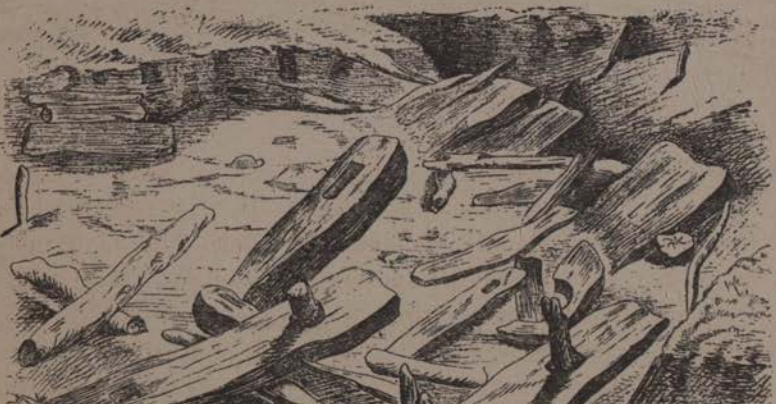


Fig. 137.—Sketch showing part of surrounding Stockade with Mortised Beams.

constituted what was supposed to have been a landing stage, as from it a neatly-constructed flooring of wood extended for some yards inwards. Outside the stockade on the north side there was a mass of brushwood and stakes forming a kind of trelliswork, as if intended for further protection to the island. In the centre of the inner area there was a square portion, measuring 39 feet on each side, covered with closely laid beams of split stems of trees having the appearance and size of railway sleepers, which appeared to have been the flooring of a wooden house. This log-pavement (as we called it) had been surrounded by a wooden wall, the stumps of which then only remained, and a line of similar stumps ran across it, from east to west, thus bisecting the building into two nearly equal compartments. The sides of this wooden foundation looked towards the four cardinal points, and its corners just reached to the surrounding stockades. On the surface of the wooden pavement were found some fragments of curiously worked beams and some large broad boards. Some were grooved and had also square-cut holes, in which both transverse and upright beams could be mortised. (See sketch, **Fig. 138**.) A doorway, the stumps of the side-posts of which were readily distinguished, opened to the south; and in front, but more to the left, was an extensive refuse heap, in which many relics were found. This midden occupied the space between the south margin of the log-pavement and the surrounding stockades—some 10 or 12 feet in breadth by about double that in length.

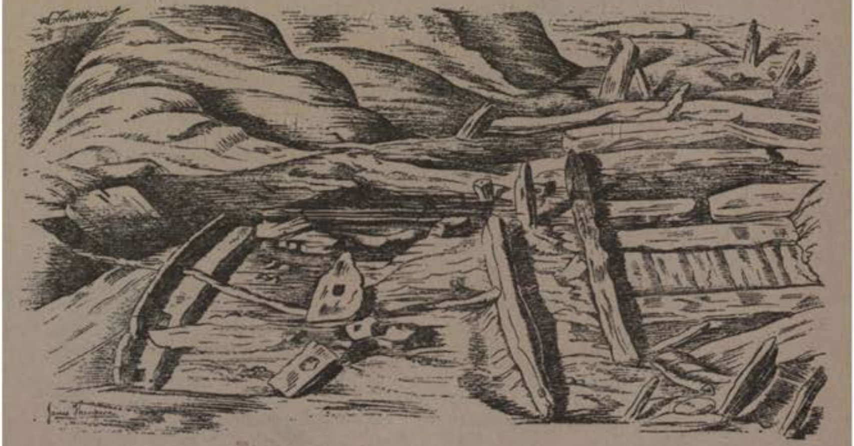


Fig. 138.—Grooved and Mortised Beams lying over Log-Pavement.

About the middle of the northern half of the log-pavement was found a remarkable series of four hearths, or fire-places, superimposed one above the other. The lowest was placed a little above the log-pavement, and had a layer of stones, clay, and earth intervening between it and the wood. About one and a half foot higher there was a second hearth; at a similar interval, a third; and at 2½ feet still higher, a fourth. These hearths were formed of small boulders laid closely together, like a stone causeway, embedded in, and surrounded by, a layer of clay (**Fig. 139**). They were oval or circular in shape and about four feet in diameter. The corresponding layers of clay extended considerably beyond the limits of the hearths around which they appeared to form a flooring. The third hearth (counting from below upwards) had been more elaborately constructed than the others, and it was surrounded by a number of stumps of stout uprights which no doubt were the remains of a secondary building, as their lower ends did not penetrate much beyond the level of the hearth. The space underneath the clay bed corresponding to this hearth, and extending downwards to the log-pavement, was, next to the refuse heap, the most prolific in relics. In it were found, about the level of the second fire-place, nearly the entire skeletons of two animals like a goat or sheep, the skulls of which had short horn-cores attached to them.

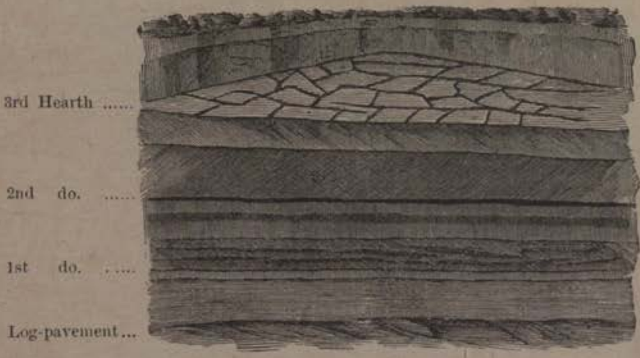

3rd Hearth ......
2nd do. ......
1st do. .....
Log-pavement...

Fig. 139.—Perpendicular Section through the Three lowest Hearths.

Gangway.—Beyond the midden, outside the island, the tops of a few piles were detected, and upon making exploratory excavations, these turned out to be the remains of a gangway. As this structure was very peculiar and somewhat comparable to the wooden structures described by Virchow and others in the German Pfahlbauten, I will here quote my original description of it *in extenso.* (See plan and sections, facing page 416):—

"We commenced this inquiry by excavating a rectangular space, 30 feet long, 16 feet broad, and 3 to 4 feet deep, in the line of direction indicated by the piles, and exposed quite a forest of oak stakes. Other trenches were then made with exactly similar results. The stakes thus revealed did not at first appear to conform to any systematic arrangement, but by-and-by we detected, in addition to six single piles, small groups of three, four, and five, here and there at short intervals. This observation, however, conveyed little or no meaning, so that we could form no opinion as to the manner in which they were used. Up to this point no trace of mortised beams was anywhere to be seen. In all these trenches the stuff dug up was of the same character. First or uppermost was a bed of fine clay rather more than 2 feet thick, and then a soft dark substance formed of decomposed vegetable matter. The source of the latter was evident from the occurrence in its upper stratum of large quantities of leaves, some stems, branches, and the roots of stunted trees *in situ.* The tops of the piles in the trench next the crannog were from 2 to 3 feet below the surface of the field, but they rose gradually as we receded from the crannog, and in the trench next the shore one or two were found on a level with the grass. About 4 feet deep the stuff at the bottom of the trench was so soft that a man could scarcely stand on it without sinking ankle-deep. It was not nearly so heavy as the upper strata, but more adhesive, and of a nutty-brown colour, which, on exposure, quickly turned dark. Notwithstanding the flabbiness of this material, the piles felt quite firm, and this fact, together with the experience derived from our examination of the deeper structures of the island, led to the supposition that the piles must terminate in some more solid basis than had yet been made apparent. To remove all doubts on this point, though a long iron rod could be easily pushed downwards without meeting any resistance, we ordered a large deep shaft to be dug in the line of the piles, and the cutting nearest the crannog was selected for this purpose. This was accomplished with much difficulty, but we were amply rewarded by coming upon an elaborate system of woodwork, which I found no less difficult to comprehend than it now is to describe. The first horizontal beam was reached about 7 feet deep, and for other 3 feet we passed through a complete network of similar beams, lying in various directions. Below this—*i.e.* 10 feet from the surface—the workmen could find no more beams and the lake silt became harder and more friable. We then cleared a larger area, so as, if possible, to exhibit the structural arrangement of the woodwork. The reason of grouping the piles now became apparent. The groups were placed in a somewhat zigzag fashion near the sides of the gangway, and from each there radiated a series of horizontal beams, the ends of which crossed each other and were kept in position by the uprights. One group was carefully inspected. The first or lowest beam observed was right across, the next lay lengthways and of course at right angles to the former, then three or four spread out diagonally like a fan, and terminated in other groups at the opposite side of the gangway, and lastly, one again lay lengthways. Thus each beam raised the level of the general structure the exact height of its thickness, though large lozenge-shaped spaces remained in the middle quite clear of any beams. The general breadth of the portion of this unique structure examined was about 10 feet (but an isolated pile was noticed farther out), and its thickness varied from 3 to 4 feet. A large oak plank, some 10 feet long, showing the marks of the sharp-cutting instrument by which it was formed, was found lying on edge at its west side, and beyond the line of piles, but otherwise no remains of a platform were seen. All the beams and stakes were made of oak, and so thoroughly bound together that, though not a single joint, mortise, or pin was discovered, the whole fabric was as firm as a rock. No relics were found in any of the excavations along the line of this gangway." (B. 373, pp. 99–101.)

Structure of the Island.—Having now collected the chief facts regarding the log-pavement, its surrounding structures and superincumbent materials, we determined to sink a shaft about the centre of the crannog for the purpose of ascertaining, if possible, the thickness, composition, and mode of structure, of the island itself. This shaft was rectangular in form, and large enough to allow three men to work in it together. (See plan and sections, page 416.) After removing the three or four layers of oak planks which constituted this portion of the log-pavement, we came upon a thin layer of brushwood, and then large trunks of trees laid in regular beds or layers, each layer having its logs lying parallel to each other, but transversely or sometimes obliquely to those of the layer immediately above or below it. At the west end of the trench, after removing the first and second layers of the log-pavement, we found part of a small canoe hollowed out of an oak trunk, evidently part of an old worn-out one, thus economised and used instead of a prepared log. Much progress in this kind of excavation was by no means an easy task, as it was necessary to keep two men constantly pumping the water which copiously flowed from all directions into the trench, and even then there always remained some at the bottom. As we advanced downwards we encountered layer upon layer of the trunks of trees with the branches closely chopped off, and so soft that the spade easily cut through them. Birch was the prevailing kind of wood, but, occasionally, beams of oak were found with holes at their extremities, through which pegs of oak penetrated into other holes in the logs beneath. One such peg, some three or four inches in diameter, was found to pass through no less than four beams in successive layers, and to terminate ultimately in a round trunk over thirteen inches in diameter. One of the oak beams was extracted entire, and measured 8 feet 3 inches in length and 10 inches in breadth, and the holes in it were 5 feet apart. Others had small round projecting bars, which fitted into mortised holes in adjacent beams. Down to a depth of about four feet the logs were rudely split, but below this they were round rough trunks, with the bark still adhering to them. Their average diameter would be from six inches to one foot, and amongst them were some curiously gnarled stems occasionally displaying large knotty protuberances. Of course, in the act of digging the trench the wood was cut up into fragments, and, on being uncovered, its fibres had a natural and even fresh-like appearance, but in a few minutes after exposure to the air the freshly cut pieces became as black as ink. Amongst the *débris* thrown up from a depth of 6 feet below the log-pavement I picked up the larger portion of a broken hammer-stone or polisher, which, from the worn appearance presented by its fractured edges, must have been used subsequently to its breakage. After considerable labour, when indeed the probability of total discomfiture in reaching the bottom was freely talked of, our most energetic foreman at last announced, after cutting through a large flat trunk 14 inches thick, that underneath this he could find no trace of further woodwork. The substance removed from below the lowest logs consisted of a few twigs of hazel brushwood, embedded in a dark, firm, but friable and somewhat peaty soil, which we concluded to be the silt of the lake deposited before the foundations of the crannog were laid. The depth of this solid mass of woodwork, measuring from the surface of the log-pavement, was 9 feet 10 inches, or about sixteen feet from the surface of the field. Amongst the very last spadefuls pitched from this depth was found nearly one half of a well-formed and polished ring made of shale, the external and internal diameters of which were 3½ and 2 inches respectively.

RELICS FROM LOCHLEE.

Stone.—Several hammer-stones and sling-stones, etc. Five whetstones or hones of the ordinary form. They are made of hard claystone or sometimes fine sandstone, and vary in length from 5 to 7 inches. One 6¼ inches long has a groove running nearly its whole length (**Fig. 140**). A large oval pebble of white quartz used as an anvil. A flat circular stone, 3 inches in diameter and 1⅜ inch thick, shaped like a cheese. One stone celt made of a hard mottled greenstone (**Fig. 141**). Five upper and some bits of lower millstones or querns, mostly of granite. The former are all somewhat elongated, with a funnel-shaped hole in the centre and generally a small round hole near the margin, as seen in the accompanying illustration. Two cup-marked stones, one with two concentric circles (**Fig. 141**). One spindle-whorl of stone and three of clay (**Fig. 141**). Two flint flakes and one scraper (**Fig. 141**). Several worked portions of stones.

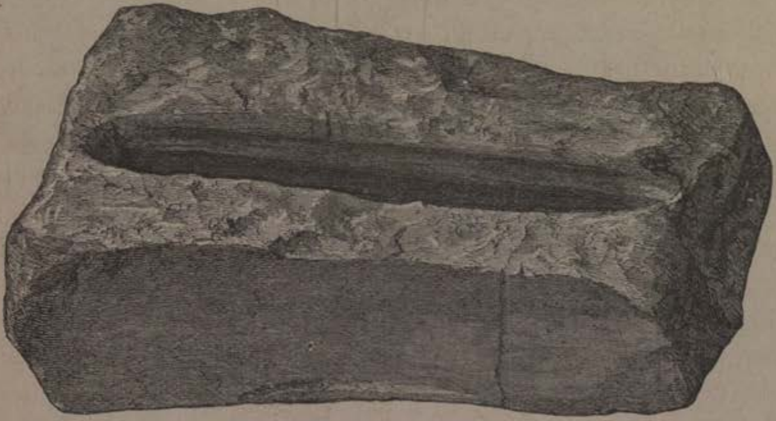
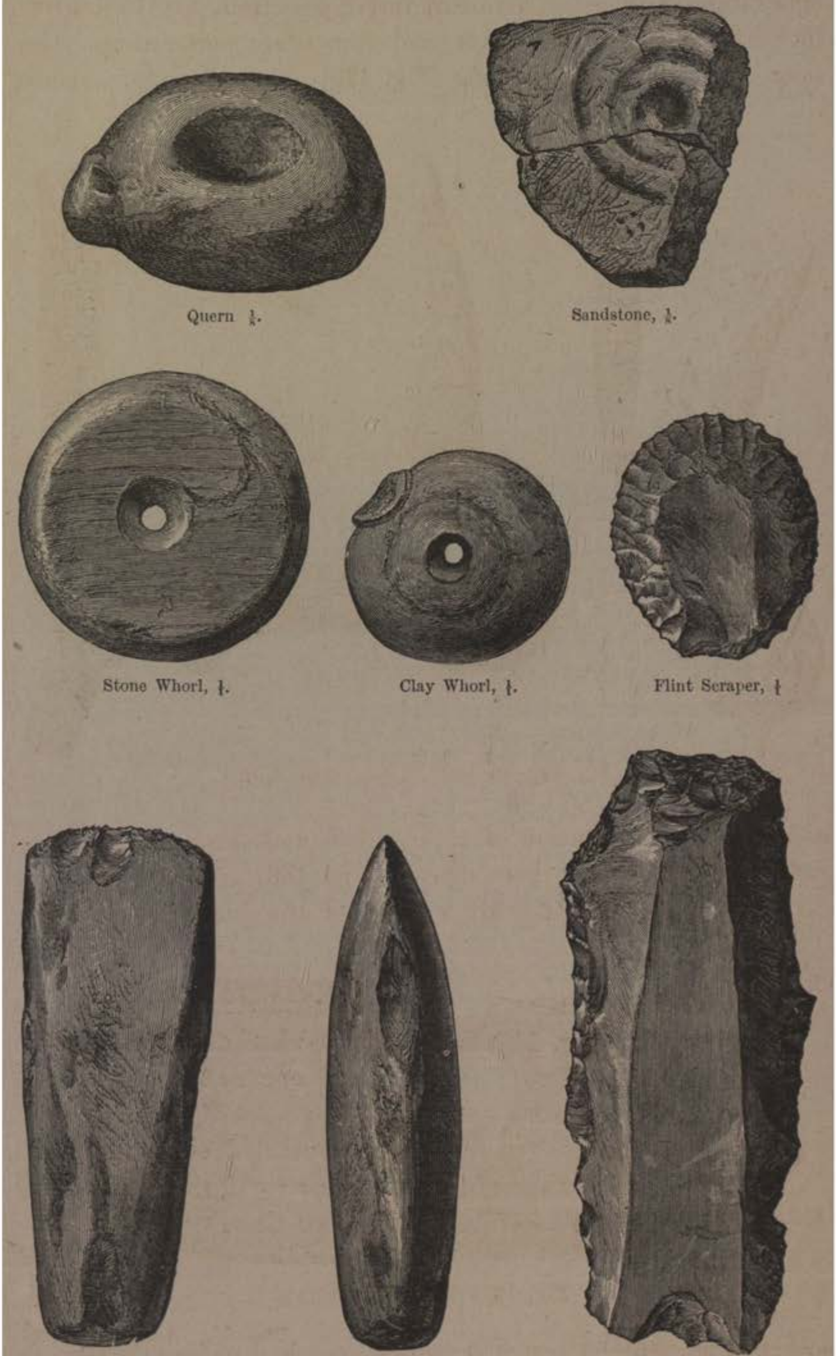


Fig. 140.—Hone, 6¼ inches long.

Bone and Horn.—Two chisels, five pointed objects, a small spoon, a needle with its eye in the middle, a small ring, and several worked bits of ribs were of bone. Of horn there were about forty worked pieces—clubs, hooks, bodkins, handles, etc. (**Fig. 142**).

Wood.—A neat trough, like a butcher's tray, cut out of the solid wood (**Fig. 143**). Five dishes turned on the lathe, bowls, plates, a ladle, etc. A piece of ashwood, 5 inches square, having a curious design carved on both sides (**Figs. 144** and **145**). Six club-like implements, a mallet, and a few things apparently intended for



Quern ⅛.

Sandstone, ¼.

Stone Whorl, ½.

Clay Whorl, ½.

Flint Scraper, ½

Stone Axe.

⅓

Flint Flake.

Fig. 141.—Objects of Stone and Clay.

agricultural purposes. Five varieties of pegs from five to fourteen inches in length, with heads and sometimes perforations. One here figured is 14 inches long (**Fig. 136**). Stern-piece of a canoe, a double paddle, portion of a large oar, and three canoes. The paddle and mallet are here figured (**Fig. 146**).

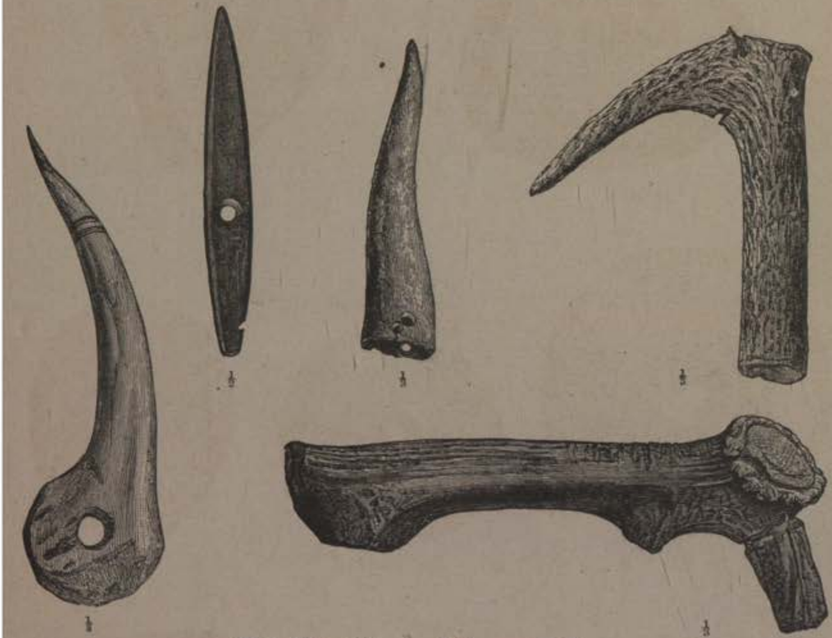


Fig. 142.—Objects of Bone and Horn.

Iron.—An axe-head with a piece of the handle still in the socket (**Fig. 146**); a gouge 8 inches long, and a chisel 10 inches long, both having tangs on which there is a thick ridge to prevent their insertion too far into the handle; two knives with

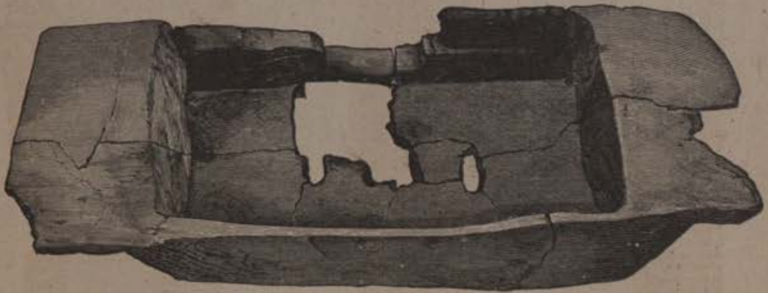


Fig. 143.—Wooden Tray ($\frac{1}{6}$).

tangs; a small punch, an awl, and other pointed implements; a cross-cut saw, in three fragments, together 38 inches in length; a large iron ring; a pair of shears; and a large three-pronged implement of a remarkable character. The last two objects are illustrated on **Fig. 147.** Two spear-heads with sockets and portions of the wooden handle remaining in each. The larger, 13 inches long, has a prominent centre ridge. Five daggers, all with tangs, one of which has a bone handle and a brass ferrule.

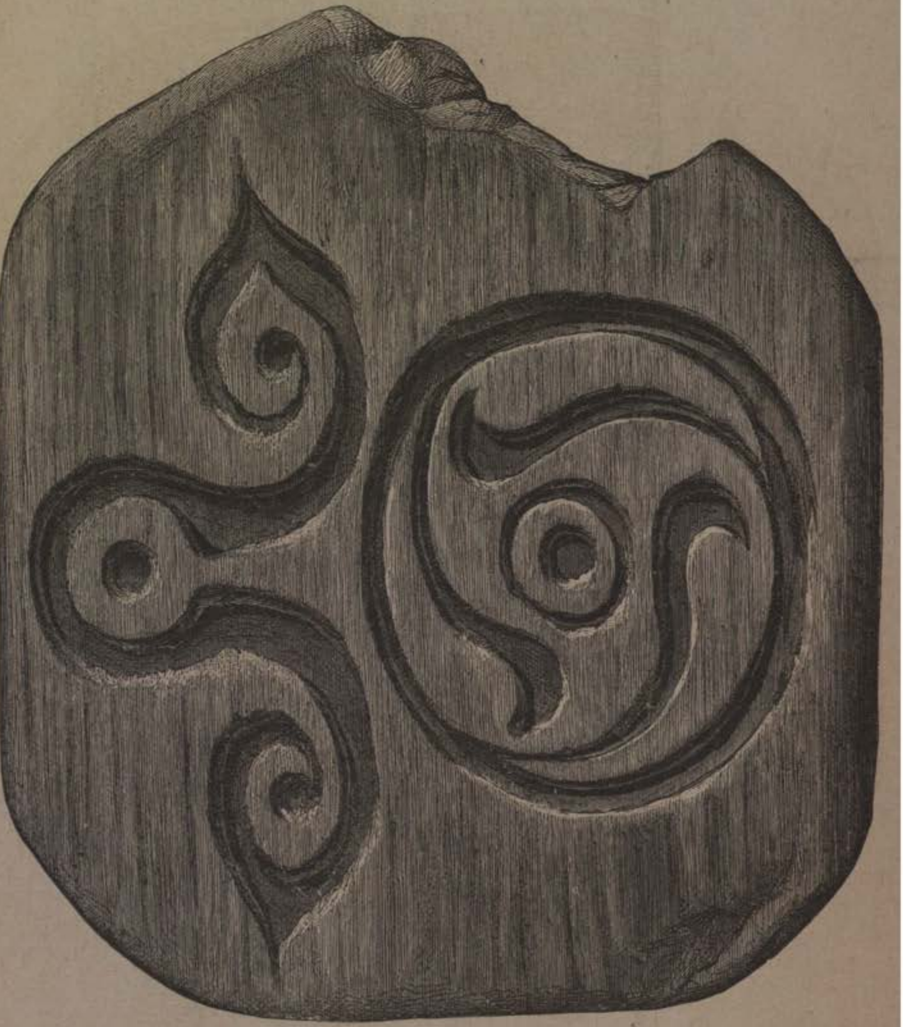


Fig. 144.—Carved Wood (1/1).

Bronze or Brass.—A curious spatula-like object of beaten bronze (**Fig. 147**). Three fibulæ and a ring pin (**Fig. 148**). The square-shaped portion at the top of the latter has a *swastika* or *croix gammée* on one side and a cross with four equal arms

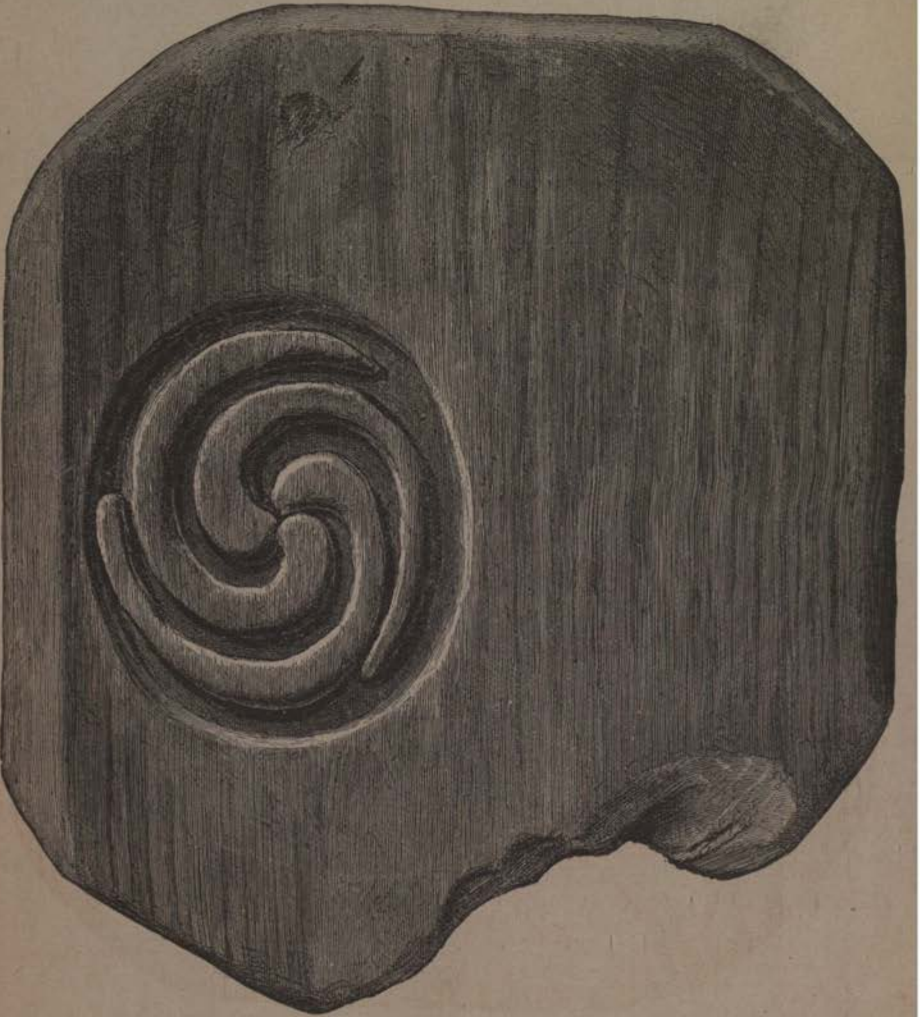
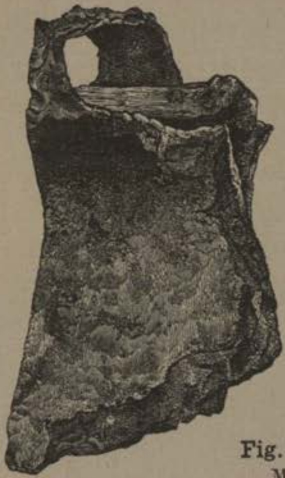


Fig. 145.—Carved—other side of Fig. 144 ($\frac{1}{2}$).

on the other. A spiral finger-ring with three twists, two portions of stout wire, and an object of unknown use.

A bridle-bit having the centre-piece of iron and the side-pieces partly of iron and partly of bronze—the rings being iron and the looped portion bronze (**Fig. 149**).

Lead.—One round knob like the hilt of a handle.



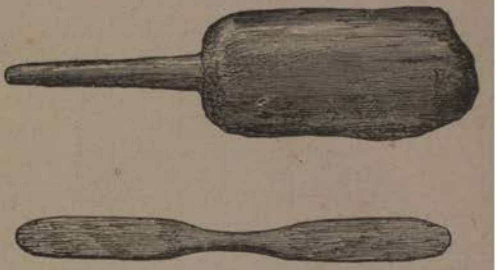
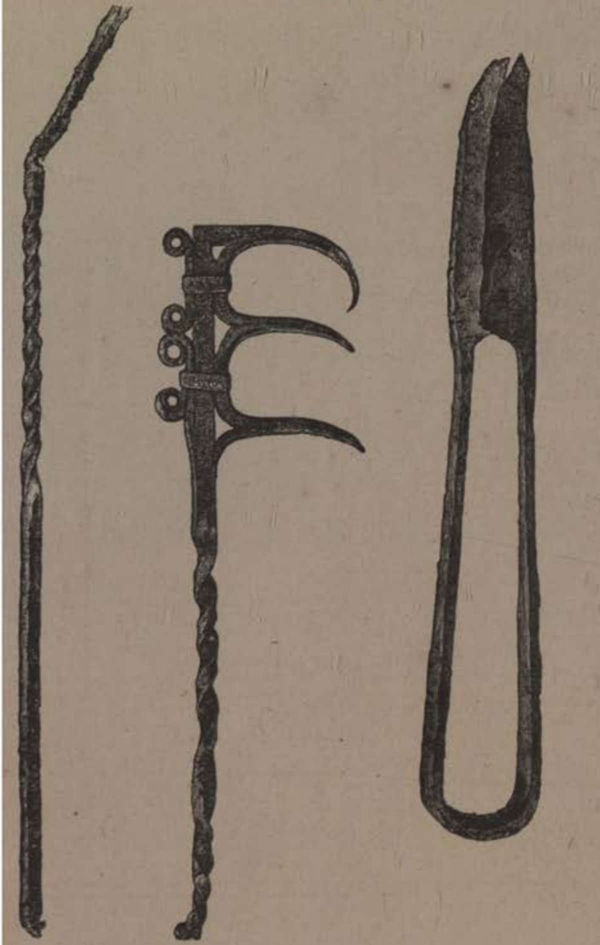


Fig. 146.—Iron Axe ($\frac{1}{2}$), Wooden Mallet ($\frac{1}{8}$), and Paddle ($\frac{1}{24}$).



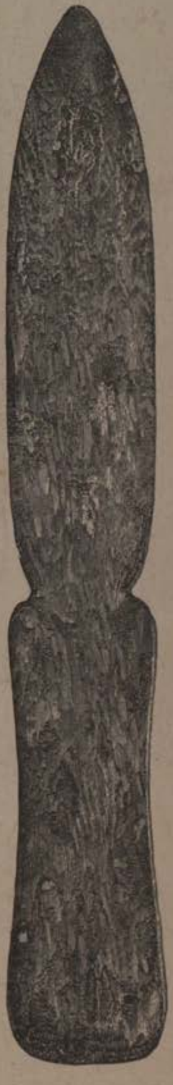
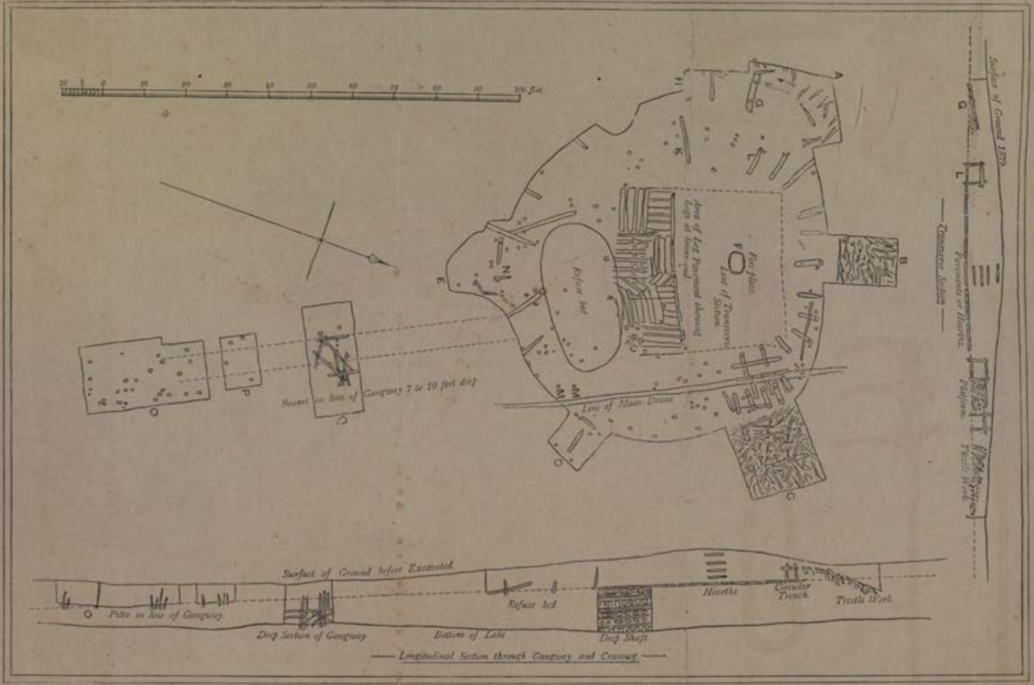


Fig. 147.—Iron Prong ($\frac{1}{5}$), Iron Shears, ($\frac{2}{3}$), and Bronze Spatula ($\frac{1}{2}$).



10 5 0 10 20 30 40 50 60 70 80 90 100 feet
A
B
C
D
E
F
G
H
K
L
M
N
O
P
Q
Fire place.
Line of Transverse Section.
Area of Log Pavement showing Logs at lower end
Refuse bed
Line of Main Drain
Beams in line of Gangway 7 to 10 feet deep
Surface of Ground 1879.
Pavements or Hearths.
Platform.
Trestle Work.
Transverse Section
Surface of Ground before Excavated
Piles in line of Gangway.
Deep Section of Gangway
Bottom of Lake
Refuse bed
Deep Shaft.
Hearths
Circular Trench.
Trestle Work.
Longitudinal Section through Gangway and Crannog.

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PLAN AND SECTIONS OF CRANNOG AT LOCHLEE.

Pottery.—Portion of the bottom of a dish like Samian ware, and five fragments of a whitish unglazed ware with parallel striæ, as if made on the wheel. Fragment of a small crucible.

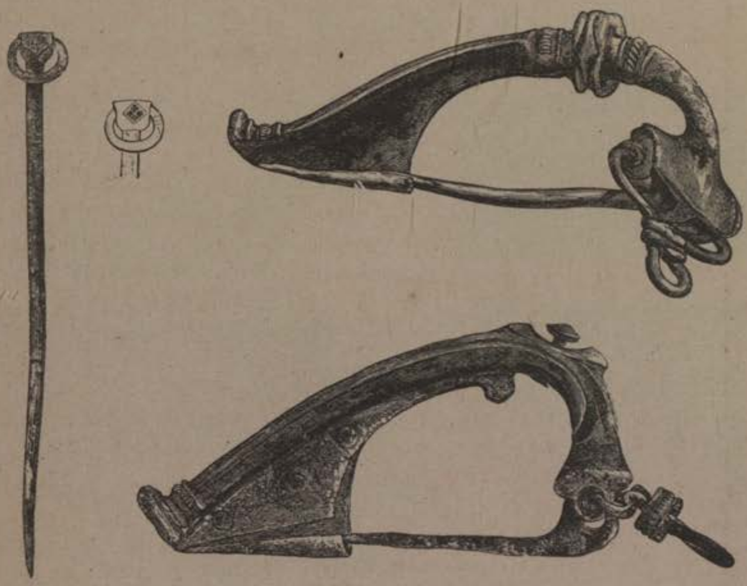

Fig. 148.—Two Fibulæ ($\frac{1}{1}$) and a Ring Pin ($\frac{1}{2}$).

Glass.—Two beads, one of earthenware of ribbed pattern and coated with green glaze, like those from Dowalton. (See **Fig. 132.**) The other is of green glass, smooth and shaped like dumb-bells.

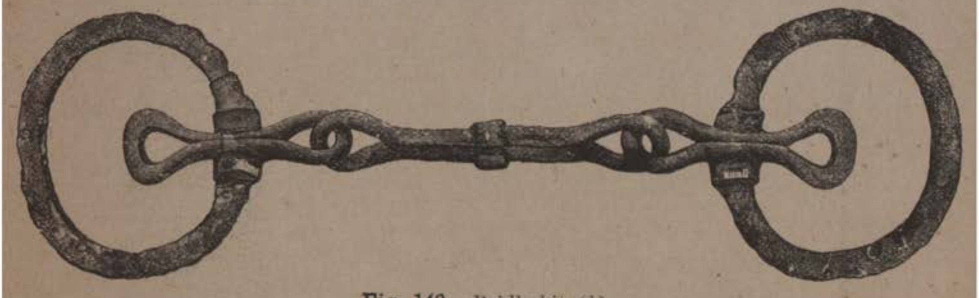

Fig. 149.—Bridle-bit ($\frac{1}{2}$).

Leather.—Portion of a shoe and various bits of leather, one being closely set with copper nails (**Fig. 150**).

Miscellaneous.—Three portions of plain jet bracelets; another portion of jet is like part of a button; a boar's tusk worked into a sharp point; lumps of blue and red pigment, and large quantities of the horny coverings of insects like beetles, and one or two brilliant-coloured *elytra*; one solitary shell (*Littorina littorea*).

An object which has excited considerable curiosity is an apparatus made like a fringe by plaiting together at one end the long stems of a kind of moss (**Fig. 150**). Portions of similar articles were found in three different parts of the crannog and all deeply buried. One portion of this moss was plaited in four plies and shaped like a cue or pig-tail. It measured 17 inches long and 2 broad in the middle, and tapered to a point.

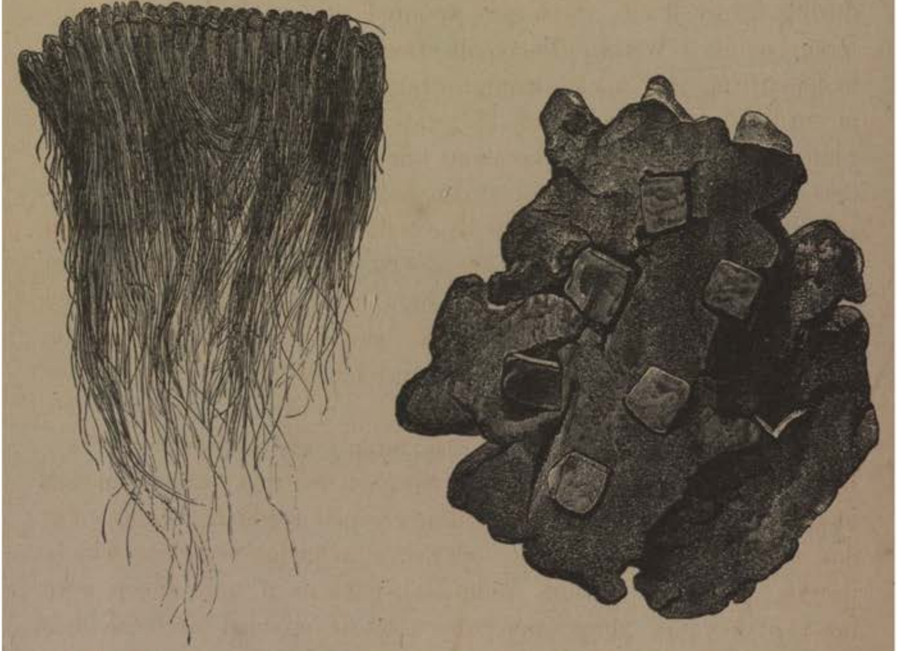

Fig. 150.—Fringe made from Stems of a Moss (*Polytrichum commune*) ($\frac{1}{3}$), and piece of Thick Leather with Copper Nails ($\frac{1}{1}$),

LOCHSPOUTS.

Lochspouts is a small lake basin, about three miles to the south-west of Maybole, somewhat oval in shape, and ensconced at the base of hilly ground, which encompasses it, except towards the north, where a narrow trap-dike runs across and cuts it off from the open valley beyond. It is thus a natural dam, formed in the face of a declivity, which, beyond the trap-ridge, still continues to slope rapidly downwards for a few hundred yards. No outlet could therefore at any time exist, except along this barrier, and an inspection of its present condition reveals several deep gashes through which at one time the surplus water made its escape. Indeed, some of the oldest inhabitants state that the name "Lochspouts" was given to it because, in former times, during heavy floods, its waters spouted across this ridge at different points. Within the recollection of some of them an artificial cutting was made through the rocky outlet, with the view of utilising its waters for a "walk-mill," an operation which reduced the level of the lake about ten feet, and its area to about two acres. A small island must have then appeared, but, apparently, its nature was unsuspected; and so it remained till 1879, when Mr. James Macfadzean recognised it as the site of an ancient lake-dwelling. This singular and, when surrounded by primeval forests, secluded little lake is now restored to its pristine dimensions; but its water, instead of acting as a defence to an island fortress, or propelling a primitive water-wheel, forms a reservoir for the domestic supply of the town of Maybole. The necessary alterations entailed by this transformation of the home of the crannog-builders—one of which was to clear out the accumulated *débris* of many a jovial feast in which, judging from the osseous remnants, pigs, oxen, and sheep were no rarity—came very opportunely, as it enabled archæologists to complete an investigation which was in the first instance initiated through the liberality of Sir James Fergusson, the proprietor.

The remains of the crannog, in the form of a low circular mound overgrown with coarse grass, lay at the north side of the lake, near the middle portion of the rocky ridge, and so close to the present margin that it formed a peninsula easily approached on *terra firma*.

At first the only possible investigation was to remove the *débris* down to the level of the water, and in the course of this operation the following facts were ascertained:—

(1) *Composition of the Mound.*—The surface of the mound was composed of coarse grass, having tough matted roots spreading in a thin layer of soil, which overlay about a foot and a half of stones and rubbish, in which no relics were found. Below this the materials were of a very variable character; sometimes

vegetable mould, stems of grasses jointed like straw, and beds of heather and moss, which could readily be separated into layers; and at other times heaps of ashes and charcoal mixed with quantities of the shells of whelks, limpets, and hazel-nuts. Intermingled with this heterogeneous mass were large and small stones, broken bones, portions of deer-horns, and various relics. Though several ash-heaps were distinctly discernible in the vicinity of the hearths, no regular refuse-heap was met with; and the broken bones and horns seemed to be dispersed over the general area of the crannog.

(2) *Log-Pavement.*—About five feet deep (measuring from the centre of the mound), and only a few inches above the level of the surrounding water, there was exposed a rude, imperfect, and irregularly shaped wooden pavement, formed of flattened oak-beams. It covered only the central portion of the area contained within the circle of piles, the rest being laid with branches and stems of trees. On digging beneath this log-pavement large beams and brushwood were generally encountered, but the voluminous gushing up of water prevented reliable observations from being made regarding these deeper structures. Occasionally ashes and charcoal were turned up, and in one spot near the centre, and under my own inspection, the men succeeded in digging downwards more than two feet below the log-pavement before the water oozed up, in the course of which nothing was turned out but pure ashes, bits of charcoal, and large quantities of the shells of limpets and common whelks. At the bottom of this hole were solid oak-beams, apparently flattened; but no sooner were their surfaces exposed than the water rushed in and filled the trench. These observations gave rise to the conjecture that this understratum represented the accumulated *débris* of another, and, of course, an older, period of human occupancy—a conjecture which also derived some support from the fact that the surface of the log-pavement was on a higher level than the tops of the encircling piles.

(3) *Hearths.*—Over the log-pavement, and a few yards apart from each other, were three circular hearths, each about five feet in diameter, formed of flat stones embedded in a bed of yellow clay, and raised on a sort of pedestal composed of clay and stones, to the extent of one to one-and-a-half foot. One of them, on being demolished, was found to have been built directly

over a former similarly constructed hearth, with an interval of about a foot. These hearths were situated near the centre of the crannog, but on its southern half—*i.e.* the semicircle farthest from the shore.

(4) *Gangway.*—On making a few trial trenches in the space directly between the shore and the crannog in search of a gangway, we could find no indications of woodwork. One day, however, my attention was directed to a portion of the log-pavement which looked like a wooden roadway projecting to the margin of the island, and pointing in a north-western direction, towards a prominence in the trap-ridge. Observing also, that, before the lake was lowered, this prominence would be the nearest land to the crannog, it immediately struck me that, if there was a gangway at all, it would be found along this line. Hypothesis was right this time. The adhesive nature of the lake sediment prevented the water from oozing up so quickly as it did on the crannog, so that we were enabled to expose the woodwork several feet below the level of the lake. Close to the crannog the upper beams of the gangway were about three feet below the surface of the grass; but as we neared the shore with the digging they became less buried, and some of the uprights were found even projecting above the ground.

The general plan on which this gangway was constructed appeared to be identical with that adopted by the crannog-builders of Lochlee. Upright piles, singly and in groups, were placed in a zigzag fashion, between, and from which, the horizontal beams stretched, fan-like, and so formed a sort of latticework, with empty lozenge-shaped spaces between.

From one of these holes, or meshes, some five feet below the surface of the ground, a fine granite quern-stone was extracted. The piles projected some two feet or more above the body of the gangway; but there was no appearance of a subaqueous or superaqueous platform. It would thus appear that its upper transverses were originally under water—a remark equally applicable to the analogous remains at Lochlee—but to what depth the wooden structures reached could not be ascertained.

Further Excavations.—In order to facilitate the projected operations of clearing out the bed of the lake the Engineers of the Maybole Waterworks caused the rocky outlet to be cut down to the extent of 3 feet, which thus enabled them to remove a corresponding section of the crannog. The result of this was to show, as was conjectured from the facts ascertained in the previous explorations, that there was, about 2½ feet underneath the log-pavement and its hearths already described, another habitable zone with its log-pavement, mortised beams, etc., together with various relics of human industry. It would appear that this was the original surface of the crannog, as it corresponded with the surrounding stockades, some of which were found in position. Others were seen among a heap of wood collected from the excavated *débris*, amongst which were a few of the ordinary transverses containing square-cut holes at their extremities. One thick beam was deeply grooved and resembled the one found at Lochlee. (See **Fig. 138.**) A few large flat planks, having a round handle-like projection some 18 inches long at one end, had only one square-cut hole, placed sometimes close to this handle, and at other times at the opposite extremity. Another stout oak beam, 6 feet long, contained a series of round holes about an inch in diameter, and from 5 to 6 inches apart. The holes, which were on the broad side of the beam, were about two inches in depth, but only penetrated half through it, and from one of them a portion of a wooden pin was extracted. This beam was in a fragmentary condition, being, like many others, partially charred.

RELICS.

Stone.—About a barrowful of hammer-stones and round pebbles from 1 to 6 inches in diameter. Polishers and whetstones also numerous, the latter sometimes perforated for suspension. Three portions of sandstone had each a circular perforation funnel-shaped on both sides. Twelve quern stones, nearly all made of granite, of which nine or ten are the upper stones. One spindle-whorl 1¾ inch in diameter. Two polished discs, one being the segment of a circle (**Fig. 151**), are supposed to have been used as mirrors. An oval implement with two hollowed surfaces like the one represented on **Fig. 175**; its length is 3¼ inches, breadth 2⅝, and thickness 1 inch. The cup-shaped cavities are too large for mere finger-marks. It is made of a hard grey trap rock and, though well wrought all over, is not polished, nor does it exhibit any markings such as are seen on the ordinary hammer-stones. Two flint scrapers, one of which is here figured (**Fig. 151**).

Bone and Horn.—A pin, chisel (**Fig. 152**), awl, two pointers, and a knife-handle are of bone. Of horn there are also only a few objects, as a pick, club, and some pointed implements of the tines of staghorn.

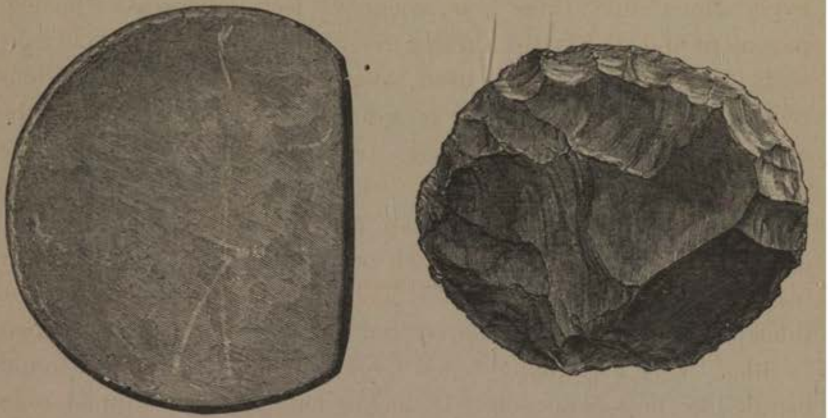

Fig. 151.—Stone Disc (½) and Flint Scraper (1/1).

Wood.—No specific object, except the stave of a vessel like that of a milk cog, was found in the earlier explorations; but from the lowest stratum there were some curious wooden implements. (See B. 373, p. 310.)

Iron.—Articles of iron were very rare and much corroded—only one retained its form sufficiently well to be recognised as a small dagger.

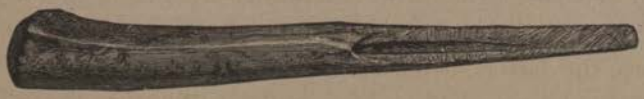

Fig. 152.—Bone Chisel (2/3).

Bronze.—Two curious objects, a key and a spiral of bronze wire, are shown on **Fig. 153.** A small finger-ring. An armlet is said to have been also found, but unfortunately could not be procured for descriptive purposes.

Lead.—A small bead-shaped portion of lead perforated with a round hole is supposed to be a spindle-whorl.

Pottery.—Several fragments of Samian ware, one ornamented

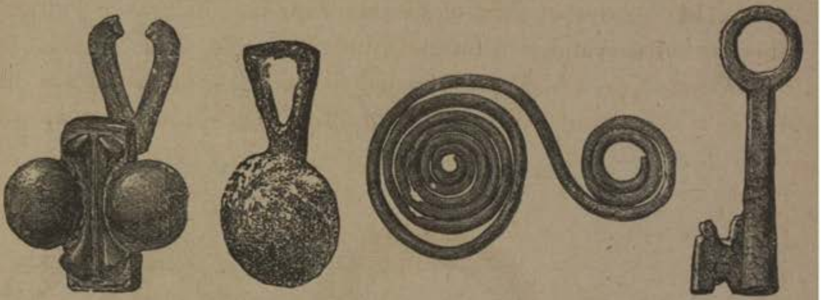

Fig. 153.—Objects of Bronze ($\frac{1}{1}$).

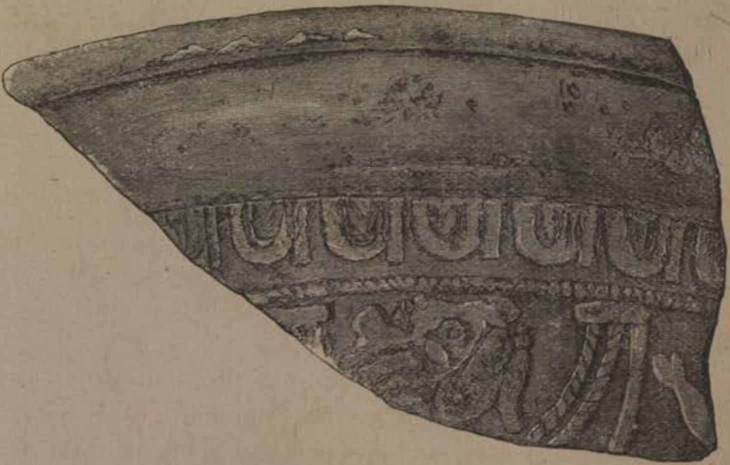

Fig. 154.—Fragment of Samian Bowl ($\frac{1}{1}$).

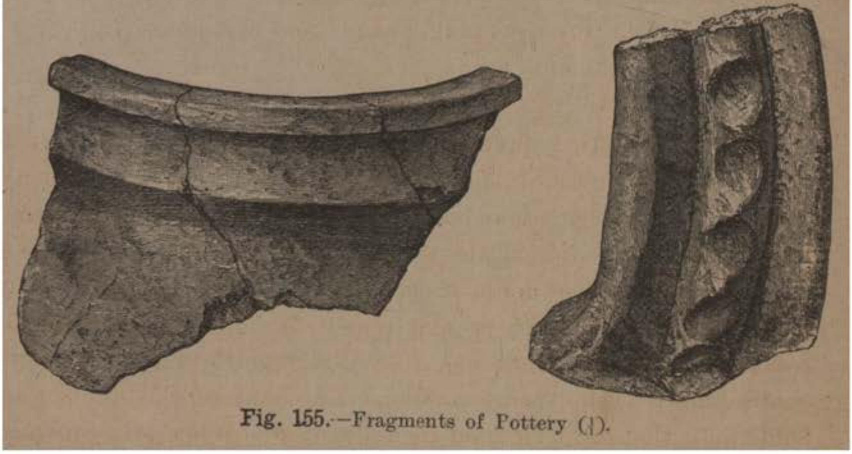

Fig. 155.—Fragments of Pottery ($\frac{1}{1}$).

(**Fig. 154**). Another kind of earthenware was of light colour, and showed handles and well-formed rims (**Fig. 155**).

Glass.—Two ribbed beads covered with a greenish glaze like those from Loch Dowalton (**Fig. 132**), one of an amber tint beautifully variegated (**Fig. 156**), and another of yellow vitreous paste.

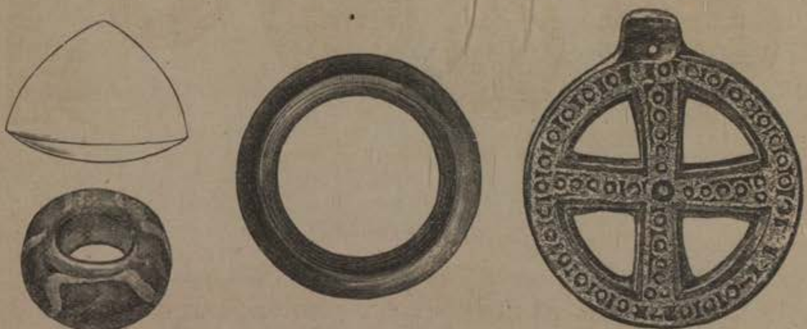

Fig. 156.—A Conical Ornament of Rock-crystal, a Glass Bead, and a Ring and Pendant of Jet (all 1/1).

Rock-Crystal.—A conical piece of rock-crystal, polished and evidently ground to its present form, is here shown in outline (**Fig. 156**).

Jet or Lignite.—Several bits showing workmanship; a polished ring 1¼ inch in diameter (**Fig. 156**), and portions of two larger ones, probably bracelets; and a remarkable pendant in the form of an encircled cross (**Fig. 156**). The arms of the cross as well as the surrounding circle are adorned with a succession of incised circles alternating with short lines which are supposed to have been intended for the reception of some kind of enamel.

BUSTON.

About half-way between Stewarton and Kilmaurs there is a shallow basin of meadowland which formerly, according to Blaeu's Atlas, was the bed of a lake of considerable size called Loch Buston. Within the recollection of the present generation this area was a mossy bog in summer and a sheet of water in winter; and about fifty years ago, when the present tenant, Mr. Robert Hay, came to reside on the farm, there was a small mound situated about its centre known as the *Swan Knowe*, on account of the number of wild swans that formerly used to frequent it. When subsequently engaged in reclaiming the bog, Mr. Hay states that as many as thirteen cart-loads of timber were removed from the "Knowe," and he distinctly remembers that, in consequence of the difficulty of detaching some of the mortised beams, his father made the remark, "there maun hae been dwellers here at ae time." He also states that until the land was thoroughly redrained, a few years ago, there was still a considerable mound to be seen; but at the beginning of December, 1880, when I first visited the locality, there was hardly any elevation to distinguish it from the surrounding field.

Notwithstanding the havoc committed on the woodwork of the crannog by a long exposure to atmospheric agencies before it finally sank under the protective influence of the muddy water, and subsequently, by the ruthless hands of the agriculturist, there still remained sufficient materials to give one not only a general, but particular and instructive notion of the mechanical principles on which the island and its superincumbent structures were constructed. The general results of the investigation may be categorically summed up as follows:—

1. The island was composed of a succession of layers of the trunks and branches of trees, intermingled in some places with stones, turf, etc.; and the whole mass was firmly knit together by means of upright piles and horizontal beams arranged in three, and in one part four, concentric circles.

2. The outer circle was intended more for protection than for giving stability to the island, and in some parts, as at the east side of the refuse-heap, the piles were closely set with their tops fixed into a transverse beam after the manner of a stair-railing; while those of the inner ones not only penetrated deeply and gave stability to the island, but also were used as part of the wall of the central building.

3. The area enclosed by the stockades was slightly oval in shape, measuring 61 feet by 56, and rudely paved with wooden beams, many of which were firmly fixed to the lower woodwork by stout wooden pegs as well as to the encircling stockades, thus affording here and there, as it were, *points d'appui.*

4. While there was one general hearth situated near the centre, evidence of one or two fire-places elsewhere was quite conclusive. One of these appeared to have been a smelting-furnace, as it contained flat stones much stained with fire-marks and several masses of heavy slag.

5. The entrance to the central area, which was determined by the stumps of two massive door-posts, had a south-easterly aspect,

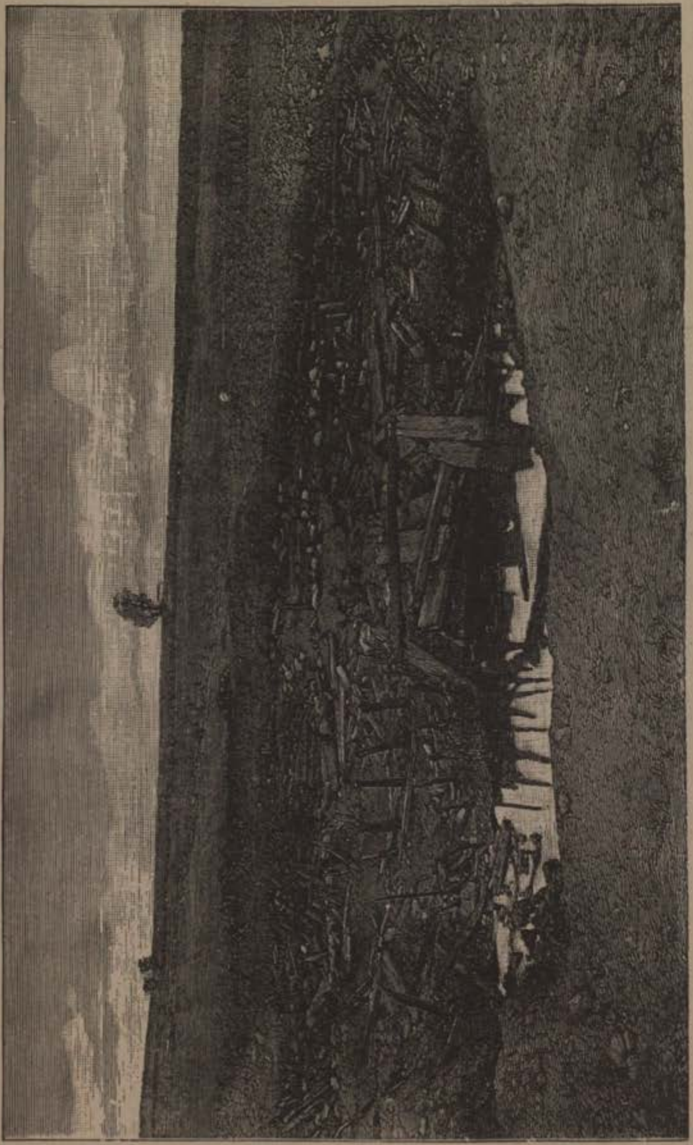

Fig. 157.—General View of Crannog at Buston, looking northwards.

and in front of it there was a well-constructed wooden platform, made of large oak planks supported on solid layers of wood, to which they were pinned down.

6. Beyond this platform, and separated from it by a massive

wooden railing which was continuous with the inner circle of stockades, was the refuse-heap; and to the right a wooden pathway, also protected on its outer side, led downwards and westwards to the outer circle, where there appeared to have been a landing-stage. (See **Figs. 157** and **158.**) About twelve yards in advance of this stage, and 4 feet from the surface of the field, a canoe was found buried in the ancient mud of the lake (**Fig. 159**).

This canoe was 22 feet long, 3 feet 6 inches broad at the stern, widening to about four feet in the middle, and 1 foot 10 inches deep. It is remarkable as showing evidence of having been repaired in two places by neatly fitting pieces of oak planking, which were kept in position by transverse ribs and wooden pins. The stern-piece was movable and fitted into a groove in the sides of the boat. In the mud removed from its interior were a few stones and portion of the skull of an ox.

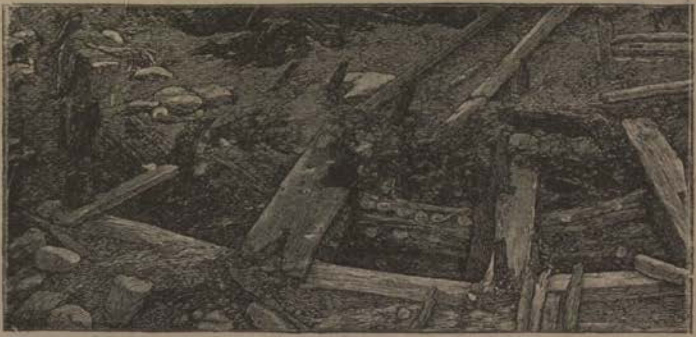

Fig. 158.—Portion of north side of Buston Crannog, with the space between Inner and Second Circles of Piles dug out, showing arrangement of Mortised Beams and structure of Island.

The refuse-heap occupied an oblong position immediately in front of the southern entrance. It measured some 30 feet long by 15 or 20 broad, and 5 feet deep alongside the above-mentioned railing. Here nearly all the relics and some massive bones were found. These bones were abundantly impregnated with the mineral vivianite, both in its amorphous and crystalline condition, but the specimens of crystals here were much inferior to those from Lochlee. The position of the refuse-heap is seen in the immediate foreground of **Fig. 157**, after the removal of its contents, as a pit partially occupied with water.

The crannog was about one hundred and fifty yards from the nearest shore, and there was no trace of a gangway observed.

LIST OF RELICS.

Stone.—Hammer-stones, polishers, and whetstones were comparatively rare, only some half dozen being found. Among the latter are fragments of a circular grindstone of fine red sandstone, showing a diameter of about fifteen inches, and a large oblong smooth stone perforated at one end.

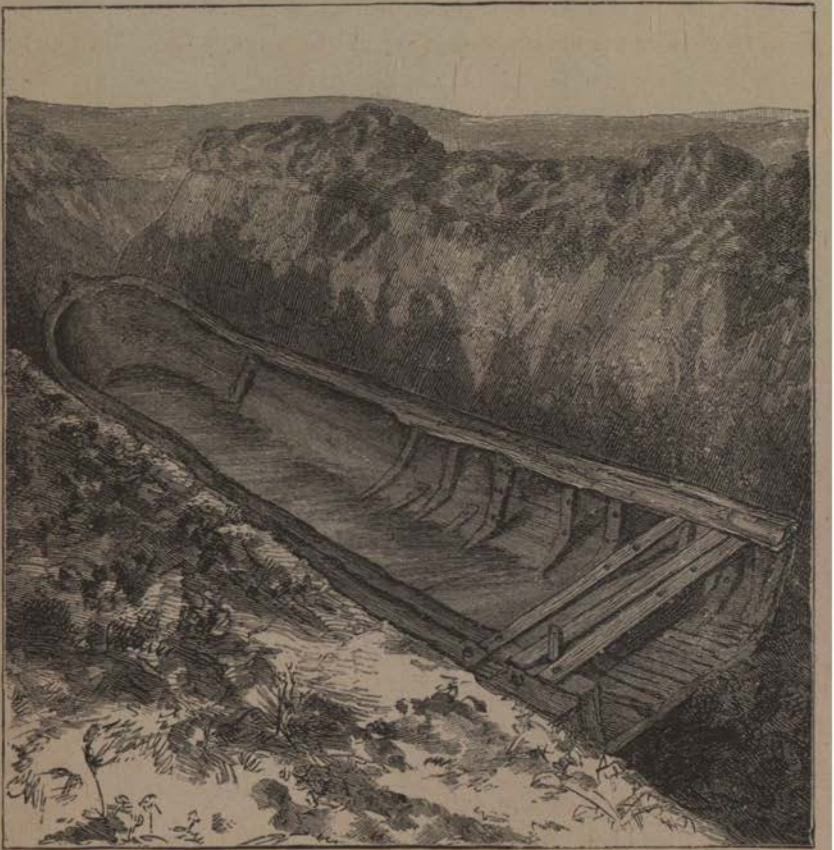

Fig. 159.—Appearance of Canoe *in situ* after exposure.

Two blocks of sandstone with irregularly shaped cavities in each; a third has a large cup-shaped cavity 5½ inches in diameter and 2½ inches deep, and on it are the marks of sharpening tools; hence the cup is supposed to have been for holding water for facilitating the operation of sharpening. Another small fragment has a neatly formed cup-shaped cavity. Two querns, both upper stones; one is of the usual form, but the other is flat and more like a modern millstone. It measures 18 inches across and the central hole is 3 inches in diameter, but not funnel-shaped. For the insertion of a handle there is a square-cut hole near the margin.

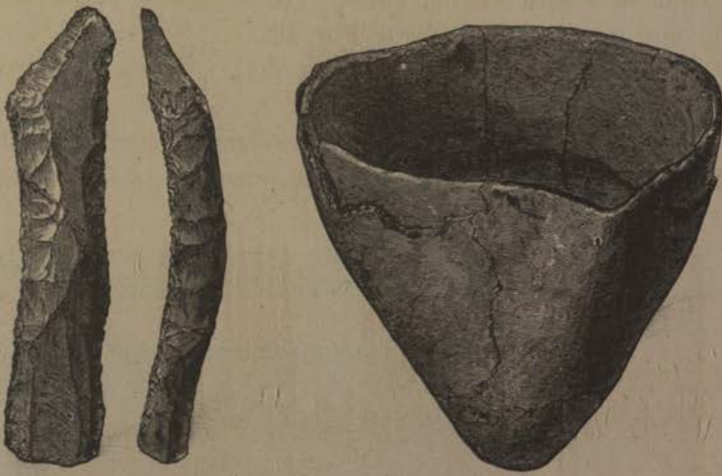

Fig. 160.—Flint Knife and Clay Crucible ($\frac{1}{1}$).

Two spindle-whorls, one of which was of cannel coal. Three crucibles, one having particles of gold in its crevices and another the remains of a yellowish slag (**Fig. 160**). One flint knife (**Fig. 160**), two scrapers, two cores, and a few chips.

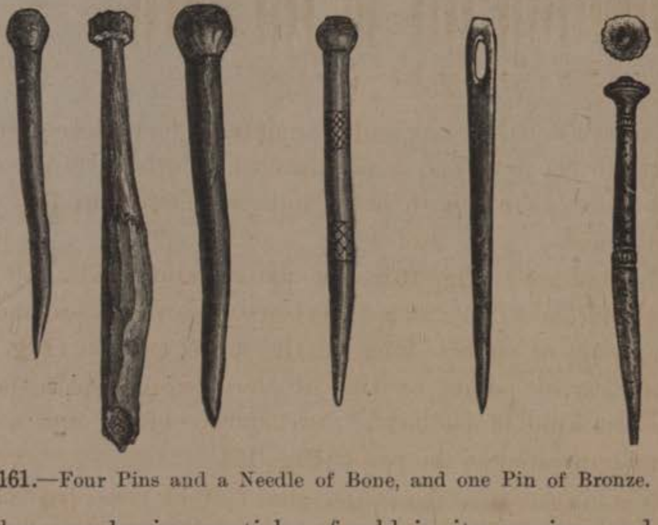

Fig. 161.—Four Pins and a Needle of Bone, and one Pin of Bronze. All ($\frac{1}{1}$).

Bone.—Twenty pins, of which only one was ornamented with a check pattern (**Fig. 161**). One darning-needle (**Fig. 161**). Three round knobs and one curiously worked object. One of the knobs is ornamented with circular lines. Three nearly perfect toilet combs and fragments of others (**Fig. 162**).

Horn.—A polished dagger 7½ inches long, another roughly cut, and a few handles.

Wood.—Fragments of a wooden bowl, ornamented with three incised lines parallel to the rim, which must have been made on a wood-turner's lathe; one small fragment had a clasp of thin brass over it as if it had been mended. Portions of an oar, a canoe, a board pierced with holes, and some large pins like those found at Lochlee.

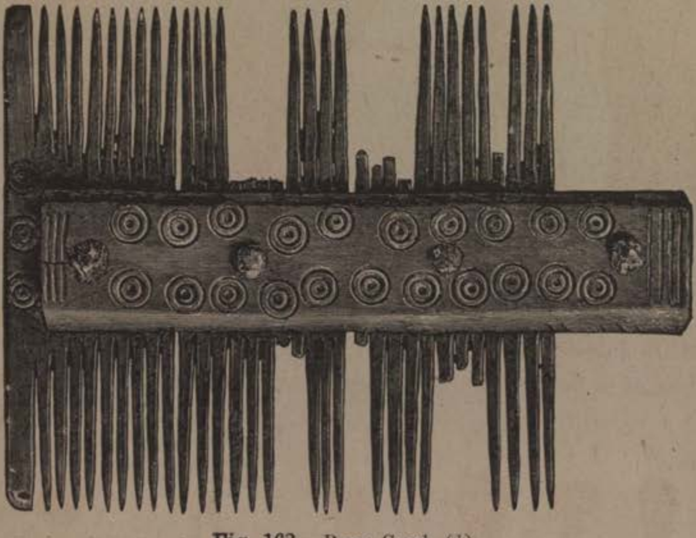

Fig. 162.—Bone Comb ($\frac{1}{1}$).

Iron.—Axe-head (**Fig. 163**), a gouge, six knife-blades, all with tangs, a punch, and three awls. Socketed spear-head, ornamented with two groups of circular lines on the socket portion (**Fig. 164**). Three large arrow-points or tips of the crossbow bolt; portion of an ancient kind of padlock;* two spiral objects, and a small instrument bifurcated at the point (**Fig. 164**).

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* Among the objects from Lagore mentioned by Lord Talbot (**Fig. 103**) is a peculiar iron pipe, described as of unknown use. It is rather remarkable that it and this bayonet-like object from Buston should be the counterparts of a kind of padlock in use in the earlier Middle Ages, which acted in the following manner:—When a spring-bolt (like that of the object from Buston) was passed through the tube

Bronze.—A circular brooch (**Fig. 164**), two pins, one with an ornamented stone and a blue bead setting in the top of the head (**Fig. 161**), and several little bits of brass-foil.

Gold.—Two spiral finger-rings, and a small coin, doubled up when found (**Fig. 165**). Regarding this coin, Dr. Evans reports as follows:—

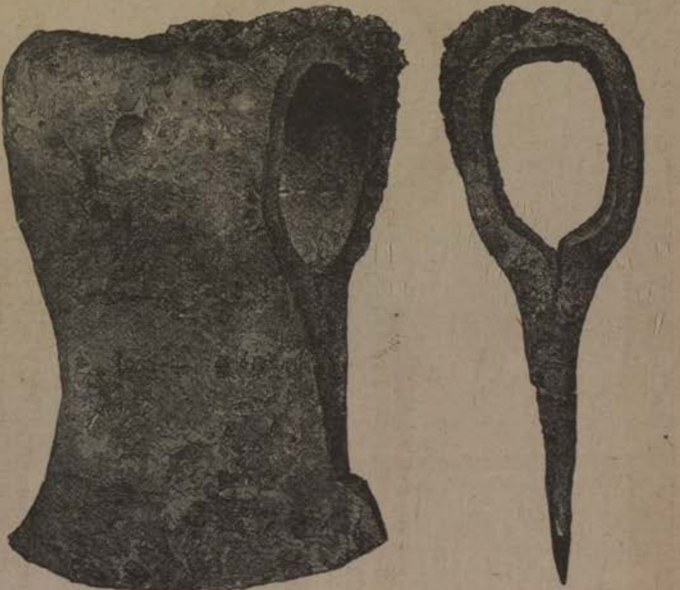

Fig. 163.—An Iron Axe (⅔).

"The two plates of gold seem originally to have formed the shell of an early forgery of a coin, the oxidised core of which forms the contents of the small tube. I thought at first that the substance might be resinous, but I think it is some salt of copper. Some chemist could readily try this [this has since been proved to be a salt of copper]. The coin itself belongs to a class of trientes which have been found almost exclusively in England, and are probably of Saxon origin. See Smith's "Coll. Ant.," vol. i. Pl. xxii. 9. Others were in the Bagshot Heath or Crondale find. See *Num. Chron.*, vi. These probably belong to the sixth or seventh century. The find is of value as helping to assign a date to the crannog." (B. 373, p. 231.)

upwards, the spike attached to the latter passed through the perforation in the former. Inside the tube there were two small prominences, which when the bolt was pushed sufficiently home caught the tips of its springs and prevented its return. In this state the padlock was securely locked, and it could only be opened by a key consisting of another but smaller tube, which, when passed through the other end of the larger tube and over the springs, pressed the latter close to the body of the bolt until their tips became clear of the internal catches, and so allowed the spring-bolt to be extracted.

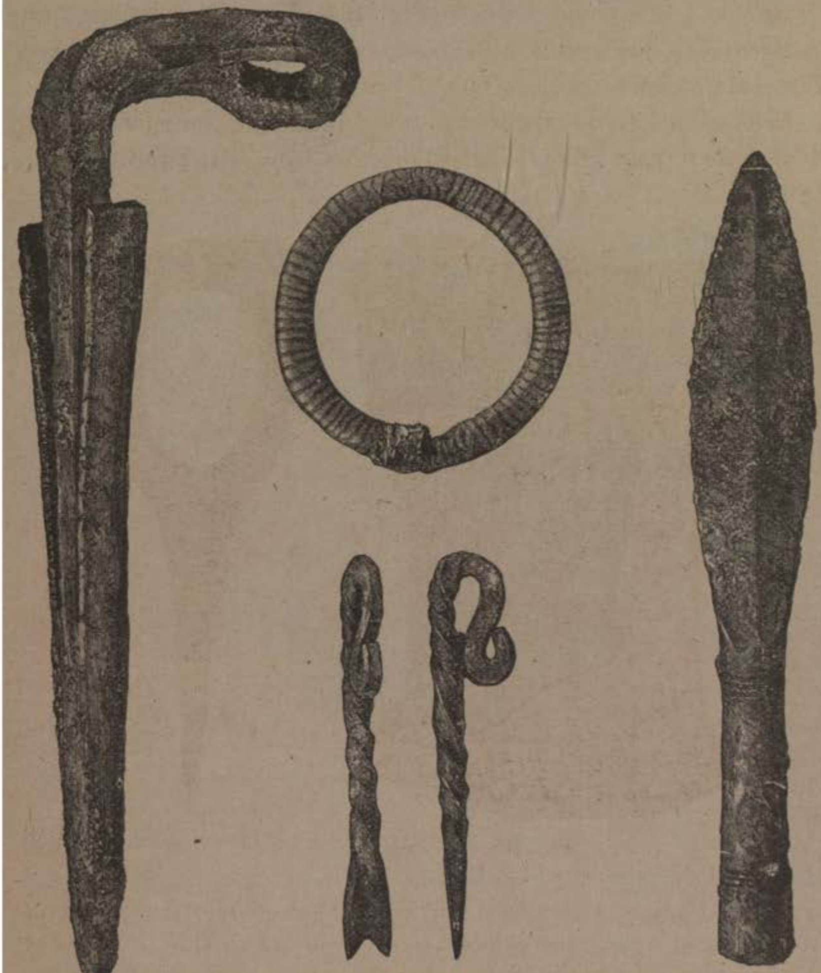

Fig. 164.—Bolt of Padlock ($\frac{1}{1}$), Spear-head ($\frac{1}{2}$), and a small Tool of Iron ($\frac{1}{1}$), and a circular Brooch of Bronze ($\frac{1}{1}$).

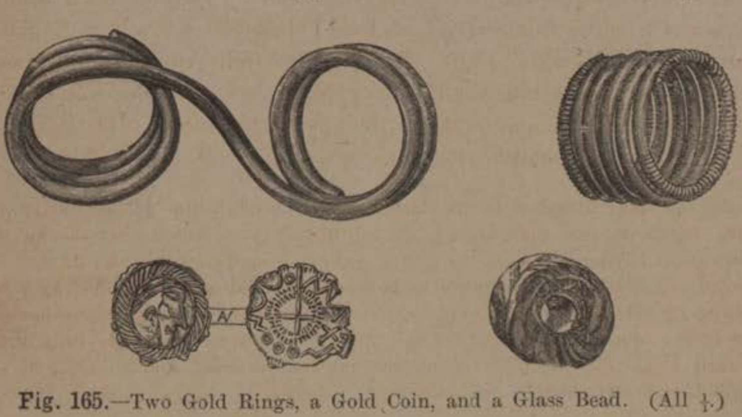

Fig. 165.—Two Gold Rings, a Gold Coin, and a Glass Bead. (All $\frac{1}{1}$.)

Glass.—A cylindrically-shaped bead, variegated with three different colours, red and yellow predominating over patches of transparent glass (**Fig. 165**); a tiny bead of yellow paste; a round object of the size of a marble, made of variegated paste, but without any aperture; a flattened drop of a whitish paste about the size of a shilling; one or two bits of dark slag; three fragments of bright-green glass.

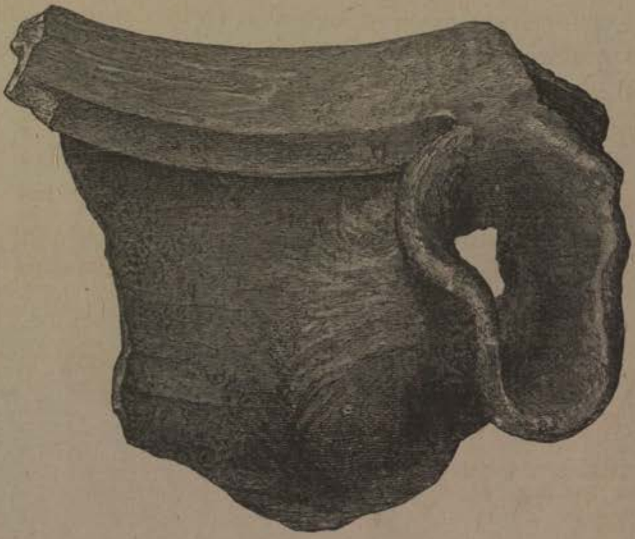

Fig. 166.—Fragment of Pottery (½).

Several strips of leather.

Jet.—Fragments of three armlets, and a small ornament like the terminal link of an antique necklace.

Pottery.—Fragment of Samian ware, and fragments of dishes of other pottery.

One portion is here figured showing a curious aperture like the spout of a jug and a neatly formed rim (**Fig. 166**).

AIRRIEOULLAND.

"This crannog," writes Sir H. Maxwell, "is situated in the centre of a peat moss, formerly a lake, and still in most summers and all winters a quaking morass. Towards the centre of this moss, which is about sixty acres in area, there is a circular enclosure 54 feet in diameter, surrounded by a low wall. This is marked in the Ordnance Survey maps as a fort; but no fort, in the ordinary acceptation, could exist in the centre of what had been, at no very great distance of time, a lake. Although no timbers were visible at the time of our visit, the whole surface of the enclosure being green with grass, and the surrounding moss covered with heather and bog plants, its situation and character indicated its true nature to those experienced in lake-dwellings, and a very slight excavation at once confirmed this view. Beginning in the centre, the diggers exposed beneath the shallow layer of vegetable soil the familiar features of a fascine-dwelling. The only novel and most interesting feature in this crannog is the surrounding fence, which, doubtless, was the usual mode of protecting the huts or wigwams of the interior, but which in most crannogs hitherto examined has been reduced by the action of the waves to a shapeless mound or beach of small boulders. Here, however, owing to flat flags having been used, the structure is perfect, surrounding the entire islet to a height of about three feet. The depth of the structure from the surface to the alluvial bed of the lake was 4 feet. The lake bottom, into which the piles were driven, was soft peat, 7 feet deep. The moss around the island had grown since the structure was made to the level of the island; but no deductions could be made from that fact as to the age of the crannog, owing to the varying rate of the growth of moss, and to the uncertainty as to when the lake became filled up and moss ceased to grow. In the wonderfully accurate and laborious map of Timothy Pont, published in 1672, the present moss appears as a lake. Three days' labour sufficed to clear out the greater part of the contents of the enclosure. The chief relics disclosed, besides great quantities of bones of the usual kind, including those of the goat and the roe-deer, were 17 small beads of scarlet vitreous slag (**Fig. 167**), forming a portion of a necklace; a rough shale ring, several excellent hammer and grinding-stones, many quartz pebbles, which had been brought

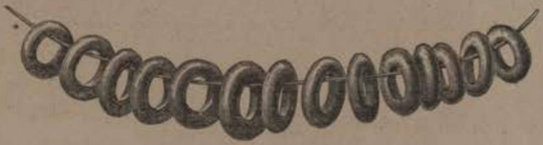

Fig. 167.—Scarlet Beads of Vitreous Paste ($\frac{1}{1}$).

for some unknown reason [sling-stones ?] from the seashore, distant about a mile; two broken crucibles (**Fig. 168**), a spinning-whorl of bone or horn. From a depth of three feet, flint flakes, a small jet ring, a portion of a perforated jet ornament, and a remarkable button-like object of bronze (**Fig. 168**)." (B. 426, p. 113.)

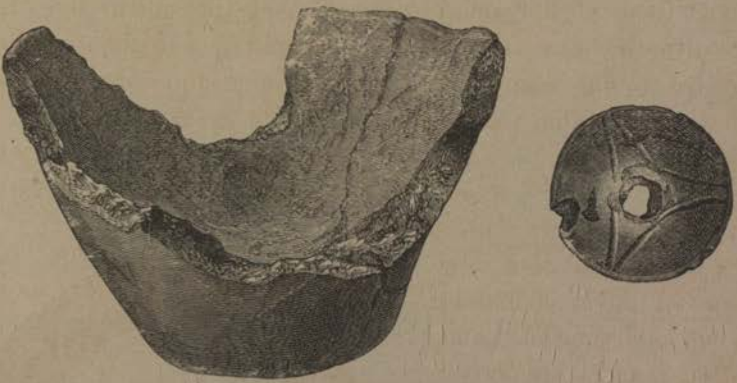

Fig. 168.—Broken Crucible and a Bronze Button ($\frac{1}{1}$).

BARHAPPLE.

Barhapple ("horse hill") Loch is a small lake some 500 yards long and 300 broad. Here, in 1880, in consequence of drainage operations, a crannog became visible; but, owing to the sponginess of its surface, no effective examination could be carried out. The Earl of Stair, finding that during the summer of 1884 the island had become much drier and harder, made arrangements to have it thoroughly investigated. That the increased firmness and consolidation of the island was due to shrinkage was manifest from the fact that the upright piles, which, when discovered, barely showed above the mud, now projected 2 or 3 feet, and presented the appearance of a decayed forest, with its stunted trunks still standing. It was also observed that this shrinkage extended to all parts of the mossy lake-bed; and, as a consequence of this, two double lines of piles became visible in the long grass, one commencing at the north and the other at the east shore of the lake. Both lines were directed to the crannog, but stopped short of it by some 20 or 30 yards. As to the structure of the crannog, it was remarked that not only the uprights, but the horizontal beams were more methodically arranged, and of a stronger character towards the margin. Here the uprights, many of which were made of young trees of oak and ash, were firmly supported, especially in the outer circle, by the intertwining among them of horizontal timbers. On the north side, in a line with the piles of one of the gangways, a distinct roadway, made of round beams, was traced, running from the margin of the island to the dwelling-house, which was situated on the east side, directly facing the other gangway. In this building two fire-places were recognised, one a little north of the other, and around them was a layer of charcoal from 5 to 12 inches thick, containing the fag-ends of burnt beams, heather, and brushwood. From among these embers some large prepared beams, also partially burnt, were disinterred, two of which terminated in round tenons, having at a little distance from their extremities a raised head or flange. From these and other appearances it was inferred that the crannog had been destroyed by a conflagration during a strong north-west gale, and as there was no evidence of much accumulated *débris*, it was supposed that this catastrophe occurred shortly after its erection. On making a trench through the island it was found that below the burnt layer there were beds of brushwood, ferns, etc., to a depth of 2 or 3 feet. Beneath this lay the peaty substance of the lake-bottom, through which an iron rod could be readily plunged to the extent of 4 feet, when it struck some hard material, probably rock or silt of the original glacial bottom.

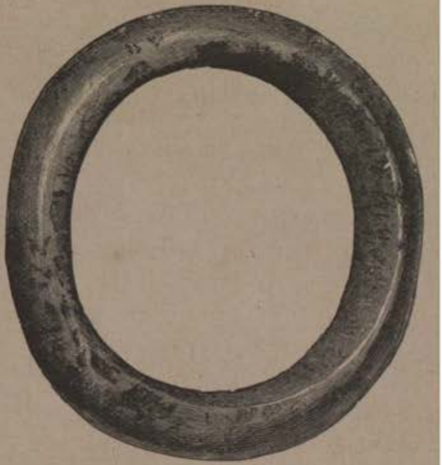

Fig. 169.—A Ring, Cannel Coal (½).

Although this was the largest crannog hitherto found in Scotland, being 157 yards in circumference, it was extremely poor in relics, a fact which may be accounted for by the shortness of its duration. The list of relics includes three shale rings (**Fig. 169**), two of which were only fragments; half a canoe; a broken paddle, and some worked pieces of wood.

WHITE LOCH OF RAVENSTONE.

This small loch, which is within a few minutes' walk of Raven stone Castle, is surrounded by a broad fringe of marsh and tall reeds. Within this marshy area, and just skirting the water's edge on its western side, there is a flat mound, some 80 feet square and 6 or 7 feet high, having on its surface the ruins of dry stone buildings. These ruins consist of the foundations of walls, a foot or so high, which clearly define the outline of a superstructure divided into five rectangular compartments. This building did not occupy the whole surface of the island, measuring only 55 feet by 47. The mound was composed of large flags and boulders, on the top of which a few trees found a suitable habitat, and no less than four of the compartments were occupied each by the trunk of a venerable looking ash. Upon investigating the base of the mound, piles and the projecting ends of transverse beams were discovered in several places, and the conjectured opinion that the entire mound was built over a substratum of woodwork was conclusively proved by digging a central pit through the only vacant compartment in the stone building. The result of this was to reveal, at a depth of eight feet, a network of beams lying transversely to each other, but to an undetermined depth.

The north or land side of the island showed signs of having been roughly built up with large undressed flags, but the rest of its stony perimeter was quite dilapidated. That the wooden island was inhabited as a crannog, before its level was raised to its present height by the addition of the enormous mass of stones and earth underlying its final buildings, an idea suggested by the discovery of charcoal and the shells of hazel-nuts over the woodwork, is a hypothesis that requires further proofs before it can be accepted as well founded in fact. (B. 426, p. 121.)

FRIAR'S CARSE.

The site of the crannog at Friar's Carse was a small pear-shaped basin situated behind a wooded knoll, close to the Parliamentary road to Dumfries, and in the midst of a well-cultivated but singularly undulating district. By deepening the outlet of this lake to the extent of two feet, a partial drainage was effected, which reduced its area from 10 to 3 acres. It was only then (1878) that it became generally known that a small bushy island near the middle of the loch had been artificially constructed of oak-planks and trunks of trees. As the weather was dry for some weeks previous to our visit, and the water particularly low, we readily stepped on to the island, over what appeared to have been the old bed of the lake, then presenting a hard, crisp, and dried-up surface of aquatic plants. The island was nearly circular in shape, measuring 80 by 70 feet, strongly built, and surrounded by piles, some of which, however, were only visible through the water. The log-pavement, which by this time had been completely bared, was composed of parallel beams of oak, arranged in groups, lying in various directions, and firmly united together by the overlapping and sometimes mortising of their ends. At the margin of the island there was a large quantity of stones, especially on its north side—*i.e.* the side towards the deepest portion of the lake.

Through these stones, which shelved under the water, a few heads of the surrounding piles projected, some above and some below the water. Mortised holes were here and there to be seen in the horizontal beams, but there was no appearance of a breast-work surrounding the wooden pavement—thus differing from the Lochlee crannog. In the centre were a few ends of uprights, in rectangular rows, seemingly the remains of partitions, one of which I traced for 40 feet in a straight line.

Upon inquiring where the rubbish removed from the island was located, we were informed that it had been wheeled to the west side of the crannog, and heaped up close to where we had stepped on to the island. Here it lay for some days; but one morning, to the great astonishment of the workmen, it was nowhere to be seen. Upon examination, it turned out that the apparently dry bed of the lake was a matted crust of mud and the roots of aquatic plants, which, virtually floating over the water, suddenly gave way under the accumulated weight and so the entire mass of the crannog rubbish disappeared in the water beneath. With this singular, but unfortunate, catastrophe terminated all prospects of finding any more relics. It appears that there was not a great depth of *débris* on the island, its maximum thickness being only 2 to 3 feet in the centre, where it formed a heap of ashes, charcoal, and some broken bones. Here a few fragments of pottery were found.

A circular portion of the log-pavement, near its centre, was covered with small stones, as if to protect it from fire; some remains of clay-flooring were observed in other parts of the island.

Regarding the deeper structures little can be said. Mr. Nelson attempted to cut a hole through the timber, and, as far as the water allowed the men to penetrate, he saw nothing but layer upon layer of oak-beams lying transversely to each other. Judging, however, from the solidity and firmness of the island, the great size of some of the logs, and the depth of the surrounding water (still about twelve feet a little to the west of the island), the total thickness of this mass of timber cannot be less than 12 or 16 feet.

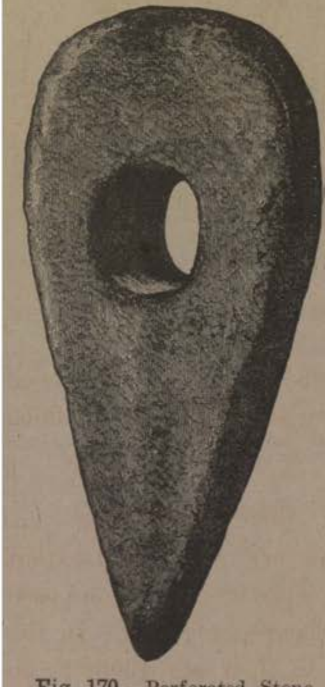

Fig. 170.—Perforated Stone Axe (⅓).

In Grose's "Antiquities of Scotland"* the following reference to this island occurs:—

> "Here was a cell dependent on the rich abbey of Melrose, which, at the Reformation, was granted by the Commendator to the Laird of Elliesland, a cadet of the Kirkpatricks of Closeburne. From whom it passed to the Maxwells of Tinwald, and from them to the Barncleugh family, also cadets of the Lords of Maxwell. From whom it went to the Riddells, of Glenriddell, the present possessors. The old refectory, or dining-room, had walls 8 feet thick, and the chimney was 12 feet wide. This old building having become ruinous, was pulled down in 1773, to make way for the present house.
>
> "Near the house was the Lough, which was the fish-pond of the friary. In the middle of which is a very curious artificial island, founded upon large piles and planks of oak, where the monks lodged their valuable effects when the English made an inroad into Strathnith."

The relics collected during the operations above recorded are very few. A canoe 22 feet long, and a ponderous axe-hammer head of whinstone (**Fig. 170**) were found at some distance from the crannog. Two handles of jars with traces of a yellowish glaze, some fragments of pottery ornamented with rows of pitted impressions (**Fig. 171**), a circular stone polisher, and an oval-shaped mass of vitreous paste, are all that were found on the crannog itself.

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* Vol. i. p. 146.

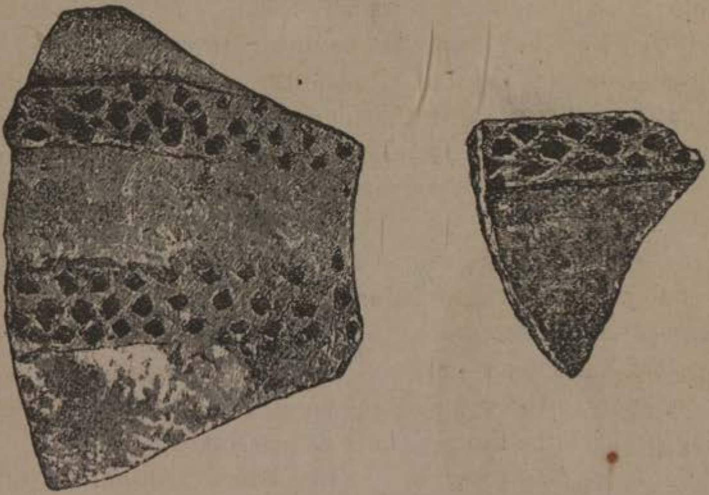

Fig. 171.—Fragments of Pottery ($\frac{2}{3}$).

STONE LAKE-DWELLINGS AND OTHER ARTIFICIAL ISLANDS.

But besides the wooden islands there are others, still extant in several of our Scottish lakes, which appear to be composed entirely of stones and earth irregularly heaped together. In the absence of any historical knowledge as to their age there is no *prima facie* reason why some of these should not be contemporary with the former, as it cannot be assumed that the crannog-builders made wood a *sine quâ non* in the structure of islands. There were, no doubt, certain stagnant marshes and small lochs in which a wooden foundation was essential for the construction of an island, owing to the softness and yielding nature of the mud; but, on the other hand, there were others with compact rocky or gravelly beds, in which any solid materials, as stones, earth, turf, etc., would be equally applicable. The outlets of the larger lakes, more especially such as were formed in glacial and rock-cut basins, were more adapted for the latter, and as far as my observations have enabled me to form an opinion, these are the very situations in which the lake stone-dwellings abound. Some of them are mere shapeless cairns, without any indications of having been formerly inhabited, while on others some remains of stone buildings are to be seen. As to wooden huts or houses, had such structures ever been erected on them, it is not likely that they could, for any length of time, have resisted the decaying tendencies of atmospheric agencies, so that all traces of them would have disappeared long ago.

The social or military exigencies that led people to construct artificial islands would also lead them to take advantage of such natural ones as would be found most suitable, and we may reasonably infer that it is in the absence of the latter that the former would be resorted to. The great and primary object of the island-builder was the protection afforded by the surrounding lake or morass, the securing of which has continued to be the ruling principle in the erection of defensive works down to the Middle Ages, long after the wooden islands ceased to be constructed. The transition from the crannog to the massive mediæval castle, with its moat and drawbridge, is but a stage in the progressive march of civilisation.

GEOGRAPHICAL DISTRIBUTION OF SCOTTISH LAKE-DWELLINGS.

To these remarks on the structural details of a few typical crannogs, as disclosed by systematic research, I subjoin a tabulated list of all the sites hitherto recognised in Scotland, comprising not only the artificial islands, whether of wood or other materials, but also some natural ones known to have been artificially strengthened, as well as a few examples of castles, etc., now or formerly located in bogs or drained marshes.

LIST OF SCOTTISH CRANNOGS ALPHABETICALLY ARRANGED, WITH NOTES AND REFERENCES.

N.B.—An obelisk (†) before a name in this text indicates that the island is, in whole or in part, constructed of wood. N.S.A. or O.S.A. stand for New or Old Statistical Account of Scotland.

†Achilty L., co. Ross. N. S. A., vol. xiv. p. 238.
Achray L., co. Perth. B. 94, pp. 172–7.
†Airrieoulland, co. Wigtown. B. 426.
Ard L., co. Perth. O. S. A., vol. x. p. 130.

[1] †Arisaig L., co. Inverness. B. 150, p. 576.
†Banchory (L. of the Leys), co. Aberdeen. *Proc. S. A. Scot.*, vol. i. p. 26; vol. vi. p. 126.
†Barean L., co. Kirkcudbright. B. 373, p. 37, and *Dumf. and G. N. H. Soc.*, 1865.
†Barhapple L., co. Wigtown. "Ayr and Wig. Col.," vols. iii. and v.; B. 373; B. 192.
[2] †Barlockhart L., co. Wigtown. *Proc. S. A. Scot.*, vol. xi. p. 583; vol. xv. p. 267.
†Barnsallzie L., co. Wigtown. *Ibid.*, vol. ix. p. 377.
Battleknowes, co. Berwick. N. S. A., vol. ii. p. 171.
[3] †Black Cairn, Beauly Firth, co. Ross. "Hill Forts and Stone Circles of Scotland," p. 89; N. S. A., vol. xvii. p. 350.
†Boghall (Beith), co. Ayr. N. S. A., vol. v. p. 580.
Borgue, co. Kirkcudbright. N. S. A., vol. iv. p. 54.
Brora L., co. Sutherland. O. S. A., vol. x. p. 303; N. S. A., vol. xv. p. 151.
[4] †Bruich L. (Beauly), co. Ross. B. 442.

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[1] This crannog is of a rectangular shape, 43 feet by 41 feet, and formed of layers of large trunks laid transversely.

[2] See Note 3, p. 447.

[3] The question of submarine crannogs is still obscure, and the few facts that have come to light leave the matter in doubt as to whether the structures were originally constructed in the water or on dry land and subsequently submerged, in consequence of changes in the relative levels of sea and land. The only remains of this character that I know of in Britain are—(1) a cairn of stones on a substratum of wood near the island of Eriska, at the mouth of Loch Crerar; (2) the Black Cairn, in the Beauly Firth; and (3) some stumps of piles in Ardmore Bay, county Waterford. The mound at Eriska, which was found on examination to be of circular shape and 60 feet in diameter, was dry at low water, but submerged at spring-tides to the extent of five feet. Some ashes and charcoal and the broken bones of sheep and small oxen were the only relics of human occupancy found. The Black Cairn is noticed in the Statistical Account of Scotland, and also by Miss Maclagan. It is about four hundred yards within flood-mark. The top is only visible at low water, and the base is said to be composed of very large wooden beams.

[4] Mr. Wallace describes the island as entirely artificial, "raised upon piles and cross-beams, about fifty yards from the shore, and 189 feet long, with an average of 112 feet wide. The water immediately surrounding it is deep, and the margin of the island rises perpendicularly from the deep water, which is about seven or eight feet deep on the north and east sides, and ten or twelve feet on the south and west. The piles and cross-beams, on which it has been raised, lie like a pavement all round it, inclining to the centre. The beams are of oak, pine, and birch. Those of pine and oak are the largest. Between the beams, and all over the island, numerous pieces of charcoal were picked up. The island rises in the centre, and, after clearing away part of the luxuriant nettles and long grass, portions of a walled structure were disclosed. No trace of lime-cement could be detected, but the stones were large and well placed together. The ruins of this building raised the island to the height of seven feet above the present water-mark." The island is noticed in the historical annals, and in 1596 gave refuge to the Earl of Arran. The occurrence of vitrified materials on the surface gives to this crannog, according to Mr. Wallace, a

†Buston, co. Ayr. "Ayr and Wig. Col.," vol. iii.; B. 373.

†Canmer (Kinord) L., co. Aberdeen. B. 94, pp. 167–71.

[1] †Carlingwark L., two crannogs, co. Kirkcudbright. O. S. A., vol. viii. p. 304; B. 94, p. 126; *Proc. S. A. Scot.*, vol. vii. p. 7, and x. p. 286.

†Castle Loch, co. Wigtown. Rev. G. Wilson's "Notes."

Castletown, co. Roxburgh. N. S. A., vol. iii. p. 164.

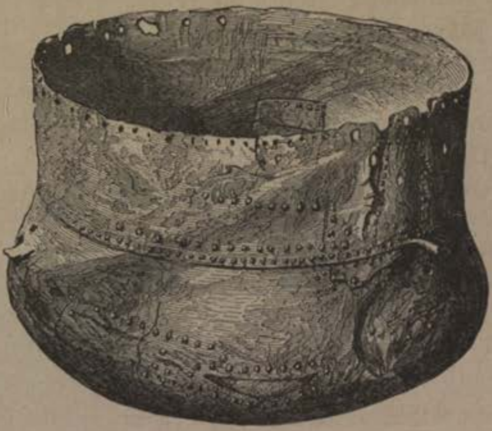

Fig. 172.—A large Bronze Cauldron from Carlingwark Loch.

peculiar interest. I could understand this interest had it been proved that vitrified buildings had been constructed over the crannog. In the construction of the crannog, of course, stones taken from the shore were used, and in this way the vitrified materials might be accounted for, or, what is more probable, they are the slag of a smelting furnace. The following are Mr. Wallace's words: "I visited the island in July, 1885, and scarcely had I set my foot on shore when I found a small piece of true vitrified rock; and great was my astonishment when I discovered that the whole island was covered with fragments of different sizes of the same material. It was found among the piles and cross-beams in great quantities. Several larger masses—one measuring four feet by three—were found on the western margin of the island, and deeply embedded among the stones and above the piles and cross-beams, close to the water's edge. After careful examination the vitrified material was found to differ in no way from that forming our vitrified forts. Between the crannog and the shore there is a smaller island of large stones, which is only visible when the loch is exceptionally low, as it was this season. This island, which measures 90 feet by 60 feet, appears to be entirely built of stones. The sides, like those of the larger island, are perpendicular. One piece of vitrified rock was found here. The distance between the islands is about sixty feet, and between the smaller one and the shore about twenty feet."

[1] Upon the partial drainage of Carlingwark Loch, in 1765, various kinds of artificial structures were observed, as wooden roadways, dams built of stone and clay, and a couple of islets constructed on a framework of black oak. In the mud were also found various relics, as a brass dagger, 22 inches long, mounted with gold plaiting; a brass pan; a remarkable cauldron (**Fig. 172**), containing bronze and iron implements; and several large stag-heads.

Closeburn, co. Dumfries. *Phil. Trans.*, 1756, p. 521; Grose, "Ant. of Scot.," vol. i. p. 150.
Clunie L., co. Perth. O. S. A., vol. ix. p. 231.
Collessie, co. Fife. O. S. A., vol. ii. p. 418.
†Corncockle (Applegarth), co. Dumfries. B. 94, p. 163.
†Cot L., co. Linlithgow. *Ibid.*, p. 159.
[1] †Croy, co. Inverness. N. S. A., vol. xiv. p. 448.
†Dhu Loch, co. Bute. B. 21, p. 43.
Dolay L., co. Sutherland. B. 94, pp. 172–7.
Doon L., co. Ayr. N. S. A., vol. v. p. 337.
†Dowalton, five crannogs, co. Wigtown. B. 56, 94, 373, and 426.
Earn L., co. Perth. O. S. A., vol. xi. p. 180.
Eldrig L., three crannogs, co. Wigtown. Rev. G. Wilson's "Notes."
[2] †Eriska, co. Argyll. B. 427, p. 192.
Fasnacloich (Appin), co. Argyll. B. 94, p. 175.
Federatt, co. Aberdeen. O. S. A., vol. ix. p. 191.
Fell L., co. Wigtown. B. 192, vol. ix. p. 378.
[3] Fergus L., co. Kirkcudbright. O. S. A., vol. xi. p. 25.
†Flemington, L., co. Nairn. B. 55, p. 118.
Forfar, Loch of, co. Forfar. B. 1; O. S. A., vol. vi. p. 528; B. 94, p. 125; B. 216, p. 31.
Freuchie L., co. Perth. B. 94, p. 173.
†Friar's Carse, co. Dumfries. B. 373, p. 152, and B. 374, p. 73.
Fullah L., co. Perth. B. 94, p. 172.
Glass L., co. Ross. O. S. A., vol. i. p. 282.
Granech L., co. Perth. B. 94, p. 177.
†Green Knowe, co. Lanark. N. S. A., vol. vi. p. 346; *Proc. S. A. S.*, vol. vi. p. 160, and vol. viii. p. 19.
Gynag L., co. Inverness. N. S. A., vol. xiv. p. 65.
Heron L., two islands, co. Wigtown. B. 192, vol. ix. p. 378.
Hogsetter L., Shetland. *Proc., S. A. Scot.* vol. xv. p. 303.
[4] †Kielziebar L., co. Argyll. B. 134, pp. 332 and 516.

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[1] "In draining a lake at the east end of the parish of Croy, an artificial mound appeared within a few yards of the shore, about sixty feet in circumference and five in height. It was formed of alternate strata of stones, earth, and oak; piles of oak being driven in the ground were kept strongly fixed by transverse beams of smaller size. Over these were round stones, and on the surface some inches of fine black mould. Some fragments of brass rings, pieces of pottery, and the bolt of a lock of no ordinary size, were found on the mound. At about a hundred yards distance there is a circle of large piles of oak, driven deep in the earth, apparently the commencement of a second mound; but for what purpose they were intended it is impossible to conjecture. At the same time a canoe, of most beautiful workmanship, was found, which some modern Goth has since cut down for mean and servile purposes."

[2] See note 3, p. 443.

[3] Artificial lake, with two islands, said to be seats of Fergus, Lord of Galloway.

[4] Rev. R. J. Mapleton thus sums up his observations:—"Altogether, I think that it is evident that the crannog was entirely composed of rock and walling, with the

†Kilbirnie L., co. Ayr. B. 268, p. 284.
Kilchonan, co. Argyll. O. S. A., vol. xi. p. 281.
[1] †Kinder L., co. Kirkcudbright. *Old. S. A.*, vol. ii. p. 139.
†Kinellan L., co. Ross. N. S. A., vol. xiv. p. 238 ; B. 94, p. 126.
Laggan L., co. Perth. O. S. A., vol. xviii. p. 327.
[2] †Ledaig, co. Argyll. B. 190.
[3] †Leven L., co. Kinross. B. 460, p. 118.
†Loch-of-the-Clans, two crannogs, co. Nairn. B. 55, pp. 116 and 332.
†Loch-in-Dunty, co. Nairn. B. 55, p. 118.
[4] †Loch-inch-Cryndil, co. Wigtown. B. 212, pp. 381 and 388.

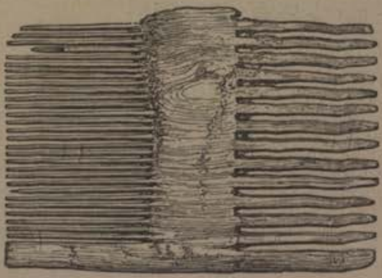

Fig. 173.—Wooden Comb from Ledaig ($\frac{2}{3}$).

middle part filled up with smaller stones ; that there existed considerable works of wood on the east, south, and west sides, at least, but whether a rampart outside or a building on the structure itself, is not quite clear ; that there was a partial causeway, now under water, and the interval either filled in with brushwood or passed over in a canoe."

[1] "In Loch Kinder there is an artificial mount of stones, rising six or seven feet above the surface of the water, and resting on a frame of large oaks, which is visible when the weather is clear and calm."

[2] An oval-shaped crannog, 50 feet long by 28 feet broad, constructed of layers of young trees laid transversely. Three fireplaces were exposed over the structure, and among the rubbish were found two broken combs made of wood, one of which is here figured (**Fig. 173**), and a piece of wood with a Greek cross, with crosslets burnt on it.

[3] Half a century ago Loch Leven was lowered nine feet by drainage, and at the present time the remains of the lake-dwelling are always from one to three feet under water. The mound measures 35 yards by 20 yards, and 1½ to 2 feet in height. In this area were detected the stumps of two rows of piles, twelve feet apart, and each pile was four or five feet apart. Also, in a line stretching to the shore, which is about sixty yards distant, there were one or two piles encountered, as if forming part of a gangway. The lake-bottom is here firm, and not liable to compression, so that the structure, whether ancient or modern, was really a pile-building. The only relics are a bit of carved wood, which might have been a handle, and a fragment of archaic-like pottery.

[4] The island is oval in shape, 180 feet long and 135 feet broad in the widest part. Fire-places, wooden floorings, and other woodworks were exposed, and a few relics, viz. an ornamented bone comb (**Fig. 174**), a flat loop of bronze, part of the rim of a large vessel of cast bronze 3 inches in length, and portion of an armlet of greenish glass, with a blue-and-white twisted cable ornament running round it.

†Lochindorb, co. Moray. O. S. A., vol. vii. p. 259.
†Lochlee, co. Ayr. "Ayr and Wig. Col.," vol. ii.; B. 331 and 373.
†Lochmaben, co. Dumfries. B. 94, p. 160; *Arch. Scot.*, vol. iii. p. 77.
†Loch-na-Mial, Island of Mull. B. 172, p. 465.
†Lochnell, co. Argyll. B. 190, vol. ix. p. 105.
†Lochore, co. Fife. B. 94, p. 160.
†Lochrutton, co. Kirkcudbright. O. S. A., vol. ii. p. 37.
†Lochspouts, co. Ayr. "Ayr and Wig. Col.," vol. iii. p. 18; iv. p. 9; B. 373, pp. 158 and 305.
Lochwood, co. Dumfries. O. S. A., vol. iv. p. 224.
[1] †Lochy L., co. Inverness. B. 94, p. 160.
[2] †Lomond L., co. Sterling. *Ibid.*, p. 131.
†Lotus L., co. Kirkcudbright. *Proc. S. A. Scot.*, vol. xi. p. 21.
[3] Machermore L., several crannogs, co. Wigtown. B. 192.
†Merton L., co. Wigtown. B. 94, p. 123.
Mochrum L., co. Wigtown. B. 192.
Monivaird L., co. Perth. O. S. A., vol. viii. p. 570.
Morall L., co. Perth. B. 94, p. 176.

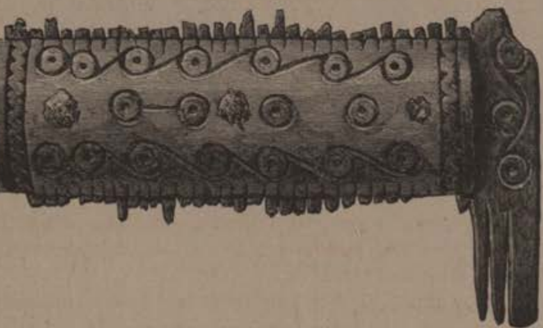

Fig. 174.—Bone Comb from Crannog in Loch-inch-Cryndil (1/1).

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[1] Dr. Stuart quotes the following account of a crannog in Loch Lochy from Mr. Robertson's notes, extracted by the latter from a MS. in the Advocate's Library, written towards the end of the seventeenth century: "Ther was of ancient ane lord in Loquhaber, called my Lord Cumming, being a cruell and tyirrant superior to the inhabitants and ancient tenants of that countrie of Loquhaber. This lord builded ane iland, or an house, on the south-east head of Loghloghae; . . . and when summer is, certain yeares or dayes, one of the bigge timber jests, the quantitie of an ell thereof will be sein above the water. And sundrie men of the countrie were wont to goe and se that jest of timber which stands there as yett; and they say that a man's finger will cast it too and fro in the water, but fortie men cannot pull it up, because it lyeth in another jest below the water." B. 94, p. 160.

[2] In Maitland's "History of Scotland" the curious observation is made that Boece states that in Loch Lomond there were fish without fins, waves without wind, and a floating island. (Boet. "Scot. Reg. Descript.," fol. 7.)

[3] The relics from the Wigtownshire crannogs, besides those already mentioned, are not numerous. From Barlockhart there is a stone ring (**Fig. 175**), two querns,

Morton, co. Dumfries. N. S. A., vol. iv. p. 96.
Moulin L., drained, co. Perth. O. S. A., vol. v. p. 69.
Mountblairy, co. Moray. O. S. A., vol. iv. p. 399.
†Moy L., Ellan-na-Glack, co. Inverness. N. S. A., vol. xiv. p. 100; B. 94, p. 129.
[1] †Oban (Lochavoullin), co. Argyll.
Orr L., co. Dumfries. O. S. A., vol. ii. p. 342.
Peel Bog, co. Aberdeen. N. S. A., vol. xii. p. 1089.
†Quien Loch, co. Bute. B. 21, p. 45.
†Rannoch L., co. Perth. N. S. A., vol. x. p. 539; B. 94, p. 129.
†Ravenstone L., co. Wigtown. B. 426, p. 121.
Rescobie L., co. Forfar. B. 94, p. 176.
†Rothiemurchus, Loch-an-Eilan, co. Moray. N. S. A., vol. xiii. p. 137; B. 94, p. 145.

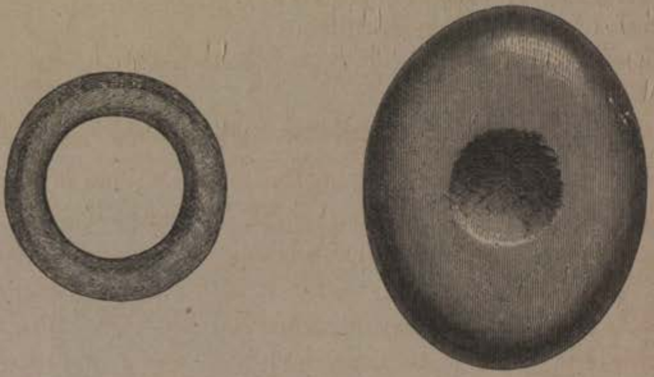

Fig. 175.—Stone Ring ($\frac{1}{1}$) and Stone Implement with a hollow surface on each side ($\frac{1}{2}$).

and a spindle-whorl of clay-slate. From one of the crannogs at Machermore Loch there is a stone implement, with circular hollows on each face (**Fig. 175**). Regarding such implements Rev. George Wilson writes thus:—"These are of two types, elongated and oval, approaching a circular form, and I wish to direct attention to them because, as yet [1879], only eight have been reported in Scotland, seven of them being from Wigtownshire" (*Proc. S. A. Scot.*, vol. xiv. p. 127). Shortly afterwards another, described at page 422, was found on the crannog of Lochspouts, in Ayrshire.

[1] Lochavoullin, situated to the east of the Oban railway station, was formerly, as the name implies, used as a dam for a water-mill, but for many years it was a marsh in the summer time, and much frequented by sportsmen on account of the number of snipes which it sheltered. It is now in the process of being utilised, partly as a green, by filling up its bed, and partly as a skating-pond; and in the course of these operations a submerged platform of wooden beams, laid in transverse layers, was detected about the centre of the marsh. I visited the locality in the spring of 1888, but beyond seeing portions of the woodwork, and determining, by probing the mud, that it extended for several yards in all directions, nothing of archæological value was discovered. So far, however, it has all the appearance of the usual crannog, an opinion which is strengthened by the physical conditions of the environment.

[1] †Sanquhar, Black Loch of, co. Dumfries. *Proc. Dumf. and Gal. N. H. Soc.*, 1863-4, p. 12, and B. 373, p. 36.
Shin L., co. Sutherland. B. 94, pp. 172-7.
†Spinie L., co. Moray. O. S. A., vol. x. p. 625.
Stravithy, co. Fife. N. S. A., vol. ix. p. 365.
†Sunonness L., co. Wigtown. B. 192, p. 738.
Tay L., co. Perth. B. 94, p. 173; O. S. A., vol. xvii. p. 465; N. S. A., vol. x. p. 465.
†Tolsta, Lewis, co. Ross. *Proc. S. A. S.*, vol. x. p. 741.
Torlundie, drained loch at, co. Inverness. *Proc. S. A. Scot.*, vol. vii. p. 519.
†Tullah L., co. Perth. B. 94, p. 172.
Tummell L., co. Perth. O. S. A., vol. ii. p. 475; B. 94, p. 129.
Urr L., co. Dumfries. B. 94, p. 160.
Vennachar L., co. Dumfries. B. 94, p. 177.
Weyoch L., co. Wigtown. B. 192.
Yetholm L., co. Rosburgh. N. S. A., vol. iii. p. 164.

CRITICAL EXAMINATION OF RELICS.

The great value, however, of the investigations of the lake-dwellings, especially in the south-west of Scotland, depends on the quantity and variety of the remains of human industry discovered in and around their sites. It is from such fragmentary remains as food refuse, stray ornaments, broken weapons, useless and worn-out implements, and such-like waifs and strays of human occupancy, that archæologists attempt to reconstruct the outlines of the social life and organisation of the prehistoric past. To those who may wish to occupy themselves with this problem these explorations have furnished, as we have just seen, a vast collection of objects made of stone, bone, horn, wood, bronze, iron, and gold.

Among the stone objects are—querns, hammer-stones, whetstones, so-called sling-stones, a few cup-marked stones (one surrounded by concentric circles), spindle-whorls, flint flakes, and scrapers, a polished celt, a perforated axe-hammer head, portions of two polished circular discs, and some oval implements with a wrought hollowed surface on each side.

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[1] This loch covers about two acres. At the north end there is a small island, covered with a rank vegetation and a few stunted trees of Scottish fir and birch. A rough, crooked causeway extended from it to the shore. "Round the island could be seen driven piles, to which were attached strong transverse beams, and upon making a cut six or seven feet wide into the side of the island to ascertain its structure, we found a platform of about four feet in depth, raised by transverse beams placed alternately across each other, and kept in position by driven piles. These last were generally small oak trees, but dressed and sharpened by a metal tool, some of them mortised at the heads, where a transverse rail or beam could be fixed."

Bones and horns of deer were utilised in various ways and manufactured into pins, needles, bodkins, awls, picks, toilet-combs, knife-handles, etc. The combs are neatly formed of three or four flat pieces kept in position by two transverse slips, one on each side, and riveted together by iron rivets. They are frequently ornamented by a series of incised circles, which are sometimes connected by a running scroll, as in **Fig. 174.**

The wooden articles consist of bowls, ladles, mallets, hoes, clubs, etc., together with a variety of other objects apparently intended for agricultural purposes.

Implements and weapons of iron are numerous Amongst the former are gouges, chisels, knives, shears, saws, hatchets, awls, hammers, a bridle-bit, the bolt of a padlock, and other objects of unknown use. The weapons consist of leaf-shaped spear-heads, both socketed and tanged, daggers, and arrow-heads resembling those of the crossbow bolt.

The objects made of bronze are mostly of an ornamental character, comprising:—harp-shaped fibulæ, circular and penannular brooches, finger-rings, a spiral ornament, ornamented pins, one with a ring top and another with a glass setting, a small key, and some other articles of an indeterminate character. From Dowalton there are basins or cauldrons of beaten bronze, some clouted and riveted; one, presumably a Roman saucepan, has the name of the maker on the handle.

On the Buston crannog were found two handsome and massive spiral finger-rings made of gold. One is plain with five and a half twists; the other, besides an additional twist, has both ends ornamented by a series of circular grooves. From the same place there is a curious gold coin, of Saxon origin, and a forgery of the sixth or seventh century.

Pottery is represented by numerous fragments, some of which are of so-called Samian ware, but the most of them are of vessels of a glazed ware, while a few are of an archaic type. Several neatly formed crucibles, containing traces of gold and slag, are also in the collection.

Among miscellaneous objects are bracelets and beads made of coloured and of variegated glass or vitreous paste; also some jet ornaments, one of which is a handsome pendant in the form of an equal-armed cross, inscribed in a circle and having one surface ornamented by a series of incised circles which contained the remains of a yellow enamel. Dr. Joseph Anderson considers this a Christian relic of a very early type. A smooth and flat piece of ashwood, with peculiar spiral carvings on both sides, and a fringe-like apparatus made of the long stems of a moss, are among the objects which have excited the greatest curiosity. Regarding a finely polished conical object made of rock-crystal found at Lochspouts, a reviewer in the *Academy*, October 14th, writes:—"Is it a charm or can it have formed the centre knob or boss in the binding of some richly decorated breviary or gospel book? Crystals very similar, but oblong in form—like a Brazil nut—may be seen in some of the rich covers of books of early date, and a few that have been detached are preserved in collections. One such object forms part of a crystal necklace in the Ashmolean Museum, and another in private hands was employed, not so very many years ago, in the West Riding of Yorkshire, for the purpose of seeing spirits. If this relic be, indeed, a book-boss, it makes it probable that the crannog was at one time inhabited, or at least visited, by Christian missionaries." Dr. Joseph Anderson has also pointed out that this object is extremely like a "large circular rock crystal which forms the central ornament on the inferior surface of the foot of the famous silver chalice, dug up at the Rath of Reerasta, near Ardagh, county Limerick, Ireland, in 1868, and now in the Museum of the Royal Irish Academy, Dublin. According to the Earl of Dunraven, this most beautiful example of our ancient art was executed either in the ninth or tenth century." (See *Proc. Soc. Antiq. Scot.*, December 4th, 1882.)

From the respective reports of Professors Owen, Rolleston, and Cléland, on a selection of osseous remains taken from the lake-dwellings at Dowalton, Lochlee, and Buston, we can form a fair idea of the food of the occupiers. The Celtic shorthorn ox, the so-called goat-horned sheep, and a domestic breed of pigs were largely consumed. The horse was only scantily used. The number of bones and horns of the red-deer and roebuck showed that venison was by no means a rare addition to the list of their dietary. Among birds, only the goose has been identified, but this is no criterion of the extent of their encroachment on the feathered tribe, as only the larger bones were collected and reported on. To this bill of fare the occupiers of Lochspouts crannog, being comparatively near the sea, added several kinds of shell-fish. In all the lake-dwellings that have come under my own observation the broken shells of hazel-nuts were in profuse abundance.

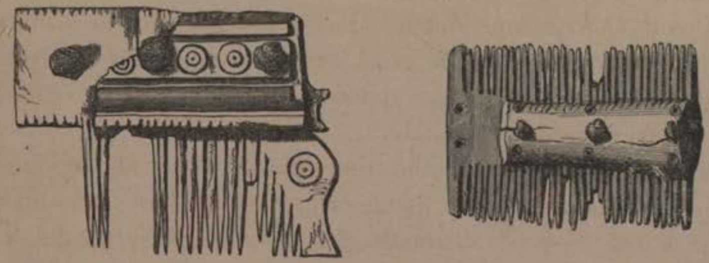
From the number of querns, and the great preponderance of the bones of domestic over those of wild animals, it may be inferred that, for subsistence, they depended more on the cultivation of the soil and the rearing of cattle, sheep, and pigs, than on the ordinary produce of the chase.

Proofs of a prolonged but occasionally interrupted occupancy are also manifested by the great accumulation of *débris* over the wooden pavements, the size and contents of the kitchen-middens, and the superimposed hearths.

Let us now look at the remarkable series of implements, weapons, ornaments, and nondescript objects here presented to us, with the view of abstracting from them some scraps of information regarding their original owners. The fragments of Samian ware, bronze dishes, harp-shaped fibulæ, and the large assortment of beads, bronze and bone pins, bone combs, jet ornaments, etc., are so similar to the class of remains found on the excavated sites of Romano-British towns, that there can hardly be any doubt that Roman civilisation had come in contact with the lake-dwellers. The Celtic element is, however, strongly developed, not only in the general character of many of the industrial implements of stone, bone, and iron, but also in the style of art manifested in some of the ornamental objects included in the collection. Thus the piece of ashwood with its carved spiral patterns (**Figs. 144** and **145**), the combs, especially the one showing a series of concentric circles connected by a running scroll design (**Fig. 174**), and some of the bronze brooches and ornaments (**Fig. 130**) present a style of ornamentation which is considered peculiar to Celtic art. The spiral finger-rings seem also to have been of native origin, and the probability is that they were manufactured where they were found, as several crucibles are amongst the relics from the same lake-dwelling, one of which, from the fact that it still contains particles of gold, proves that it had been used in melting this metal. (B. 373, p. 236.)

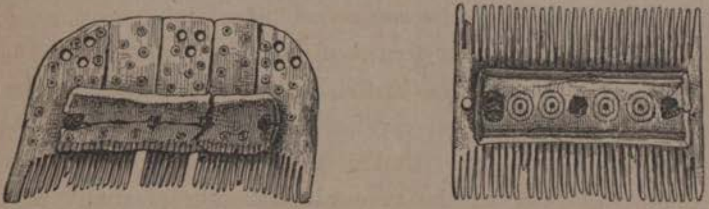
On the other hand, the forged gold coin is the only relic that can with certainty be said to have emanated from a Saxon source—at least, that cannot otherwise be accounted for.

But if from internal evidence a presumptive case is made out in favour of the Celtic origin and occupation of these lake-dwellings, it is greatly strengthened when we consider that the neighbouring Celtic races, especially in Ireland, were in the habit of erecting similar island abodes, while there is not a particle of evidence in favour of the idea that such structures originated with the Roman conquerors of Britain or its Saxon invaders.



Comb from the Roman City of Uriconium (⅔).

Comb from the Knowe of Saverough, Orkney (½).



Two Combs from the Broch of Burrian, Orkney (½).

Fig. 176.—Bone Combs, for comparison with those from the Lake-Dwellings.

The resemblance between the remains found in the Scottish and Irish lake-dwellings, as well as other antiquarian finds of Celtic character, must also not be overlooked. Combs, similar in structure and ornamentation to those from Buston, have been found in several of the Irish crannogs, in the brochs and other antiquities of the north of Scotland, and in many of the ruins of the Romano-British towns in England. (See **Figs. 105, 108,** and **176.**) Iron knives and shears, variegated beads of impure glass with grooves and spiral marks, ornaments of jet and bronze, implements of stone, bone, and horn, besides querns, whetstones, etc., are all common to Celtic antiquities, wherever found.

That many of these relics were the products of a refined civilisation is not more remarkable than the unexpected and strangely discordant circumstances in which they have been found. For this reason it might be supposed that the crannogs were the headquarters of thieves and robbers, where the proceeds of their marauding excursions among the surrounding Roman provincials were stored up. The inferences derived from a careful consideration of all the facts do not appear to me to support this view, nor do they uphold another view, sometimes propounded, viz. that they were fortified islands occupied by the guardian soldiers of the people. Indeed, amongst the relics military remains are only feebly represented by a few iron daggers and spear-heads, one or two doubtful arrow-points, and a quantity of round pebbles and so-called sling-stones. On the other hand, a very large percentage of the articles consists of querns, implements and tools, crucibles, various domestic utensils, etc., from which, not to mention the great variety of ornaments, there can be no ambiguity as to the testimony they afford of the peaceful prosecution of various arts and industries by the lake-dwellers.

There is, in my opinion, only one hypothesis that can satisfactorily account for all the facts and phenomena here adduced, viz. that the lake-dwellings in the south-west of Scotland were resorted to by the Celtic inhabitants as a means of protecting their lives and movable property when, upon the frequent withdrawal of the Roman soldiers from the district, they were left, single-handed, to contend against the Angles on the east and the Picts and Scots on the north. It is not likely that these provincials, so long accustomed to the luxury and comforts of Roman civilisation, or their descendants in the subsequent kingdom of Strathclyde, would become the assailants of such fierce and lawless enemies, from whom, even if conquered, they could derive no benefit. Hence their military tactics and operations would assume more the character of defence than aggression, and in order to defeat the object of the frequent and sudden inroads of the northern tribes, which was to plunder the inhabitants rather than to conquer the country, experience taught them the necessity of being prepared for emergencies by having certain places of more than ordinary security where they could deposit their wealth, or to which they could retire as a last resource when hard pressed. These retreats might be caves, fortified camps, or inaccessible islands, but in localities where no such natural strongholds existed the military genius of the Celtic inhabitants, prompted perhaps by inherited notions, led them to construct these wooden islands. From the final departure of the Romans to the conquest of the kingdom of Strathclyde by the Northumbrian Angles, a period of several centuries, this unfortunate people had few intervals of peace, and with their complete subjugation ended the special functions of the lake-dwellings as a national system of protection. No doubt some of them, as well as caves and such hiding-places, would continue to afford refuge to straggling remnants of natives, rendered desperate by the relentless persecution of their enemies; but ultimately all of them would fall into the hands of their Saxon conquerors, when henceforth they would be allowed to subside into mud or crumble into decay.

III.—ENGLISH LAKE-DWELLINGS.

The discovery of lacustrine abodes south of the Scottish border, though the examples are by no means so numerous or so prolific in industrial remains as those of Scotland and Ireland, is, nevertheless, of special interest on account of the intermediary position in which England stands geographically to the areas of their earliest and latest development in Europe. It will be noticed that some of the recorded observations here reproduced were actually made before antiquaries realised the importance of the subject; otherwise it is impossible to conceive how such highly suggestive facts did not at once lead to more definite information.

THE MERES OF NORFOLK AND SUFFOLK.

Wretham Mere.—Sir Charles F. Bunbury, as early as 1856, noticed some appearances in a drained *mere* near Wretham Hall which clearly point to being the remains of a lake-dwelling. In a communication on the subject to the Geological Society he says:—

> "Wretham Hall, the seat of W. Birch, Esq., is situated about six miles north of Thetford, in that extensive tract of open sandy plains which may be called upland in comparison with the fens, but of very moderate

elevation above the sea-level as is shown by the slow course of the streams flowing from it. About Wretham there are several *meres* or small natural sheets of water without any outlet. The one to which my attention was particularly directed by Mr. Birch occupied about forty-eight acres, and was situated in a slight natural depression, the ground sloping gently to it from all sides. The water has been drawn off by machinery, for the purpose of making use, as manure, of the black peaty mud which formed the bottom. This black mud, which is in parts above twenty feet deep, is nothing else than a soft, rotten, unconsolidated peat; or perhaps it should be described as vegetable matter in a more complete state of decomposition than ordinary peat, showing no distinct trace of vegetable structure. Numerous horns of red deer have been found in this peaty mud, generally (as I was informed) at 5 or 6 feet below the surface, seldom deeper; many attached to the skull, others separate, and with the appearance of having been shed naturally. What is most remarkable, several of those which were found with the skulls attached had been *sawn off* just above the brow antlers—not broken, but cut off clean and smoothly, evidently by human agency. Some of the horns are of large size, measuring 9 inches round immediately below the brow antler. . . . .

"Numerous posts of oak-wood, shaped and pointed by human art, were found standing erect, entirely buried in the peat."

It appears that in 1851 a more remarkable "find" became visible on draining another *mere* on this same estate, though the events remained unrecorded till the years 1858 and 1862. The following notice is compiled mainly and almost verbatim from Mr. Newton's observations, which he states were directly obtained from Mr. Birch, the proprietor:—

In this mere (West Mere) there was ordinarily about four feet of water, and beneath it, about eight feet of soft black mud, partly held in suspension and requiring to be removed in scoops. Near the centre of the *mere*, lying below the black mud, was found a ring or circular bank of fine white earth, sufficiently solid to allow Mr. Birch to ride upon it without yielding to the weight of his pony. Outside this ring the bottom of the *mere* was so soft and deep as to be almost impassable until the mud was cleared away. The ring was some twenty or thirty feet across, a foot wide at the top, and about four feet in height. Not far from its inner circumference was a circular hole, about four feet and a half in diameter and some six feet deeper than the bottom of the *mere*. It was marked out by a circle of stout stakes or small piles, apparently of alder, and it bore traces of having been wattled. Between these two circles were the remains of a wall, about two feet high and consequently lower than the top of the ring, composed of flints packed together with marl or soft chalk. In the same place was some earth of a bright blue colour, which, when dried, crumbled to powder, and was not preserved, though traces were still to be seen on the bones. In this interspace a still greater number of bones was found, and also the remains of a much decayed ladder, the sides and rounds of which were 15 inches apart. The stakes were about four inches in diameter, very hard, as heavy as stone, and of a dark grey colour. The fragments of the ladder, on the contrary, were very rotten and light, but the remains of both, after being kept some time, exfoliated and crumbled entirely to dust. In and around this ring there lay a vast number of bones, of which no small portion were the upper parts of the skulls of *Bos longifrons*, with the horn cores attached, and many antlers of the red deer, either entire or in fragments. All the former, excepting one unusually large example, had a fracture the size of half-a-crown in the forehead (Babington). Of the deer's antlers, some have certainly been shed in the due course of nature; but others, on the contrary, have been separated from the head by sawing. Of the other bones found in West Mere, and I am told there were hundreds of them, most of the larger ones have been fractured at one or other extremity, doubtless in order to extract the marrow they contained. Another bone, and, as far as I can make out, the only one found which presents this peculiarity, has been polished on one side; but the reason why is not very obvious, unless it has served, as I before suggested in the case of a similar specimen, for a skate. I must add that no weapons or implements of metal which can be referred to a period at all remote were brought to light in this or any of the adjoining *meres*, but a great number of flint discs were found, which, according to the description I have received (for unfortunately none of them seem to have been preserved), must have closely resembled those known to the Danish antiquaries as "Sling-Stones," from the probable use made of them. (B. 46, p. 17.)

BARTON MERE.—In 1869 the Rev. Harry Jones communicated a paper to the Suffolk Institute of Archæology and Natural History "on the discovery of some supposed vestiges of a pile-dwelling in Barton Mere, near Bury St. Edmund's," of which the following is an abstract:—

Barton Mere is situated in a natural depression, about four miles east of Bury St. Edmund's, and is mainly supplied by springs, but at some seasons water flows into it from the high land on the south, west, and north. When full it consists of about ten acres, and averages 7 feet in depth. On the north side of the *mere* there is a marly chalk, which, indeed, forms the main bottom of the *mere*, being overlaid with a dark clay deposit from 1 to 5 feet deep. The bottom layer of this deposit consists of a peaty coloured clay, so tenacious as to keep its shape upon the potter's wheel. Most of the bones and some fragments of pottery were found in this lower layer, which varies in thickness from a few inches to about a foot and a half. The *mere* is subject to occasional droughts. It has been dry at least four times in the last forty years. About thirty-eight years ago (1830), the *mere* being then dry, his grandfather, Mr. Quayle, who lived at Barton Mere, dug out a quantity of stuff for the purpose of laying it on the land. His digging resulted in a hole, which on two succeeding occasions when the water was low, saved enough to keep some of the fish alive, and provide a pond for the cattle. Bones and horns of deer, and several spear-heads and rings of bronze, were reported to have been found amidst six or seven stakes of wood *sticking up out of the bottom and about as thick as the thin part of a man's leg.*

The excavations conducted by Mr. Jones in 1867 were made by digging several holes about three feet square. In the first two holes nothing was found, but in the third an ox skull, broken bones, portions of pointed implements of bone, and a bronze socketed spear-head were disinterred. The latter, which was only 18 inches below the surface and above the peaty clay, measured 13 inches long and two inches at its widest part. The bones were of *Bos longifrons*, stag, pig, sheep or goat, large dog or wolf, urus (*Bos primigenius*), and hare. These were all in the peaty stratum. Beside, and along with the bones, were found two or three flint flakes, cores, and rude flint implements. There were several pieces of sandstone, burnt, with the mark of fire plainly upon them, and divers calcined flints. Also a fragment of a thin hand-made vessel. Besides the bones were several stags' antlers, one or two of which were gnawed, probably by dogs, and another had marks of some small-toothed animal, such as a rat. Others were cut by human hands. One antler had a hole rudely worked in it at its broadest part. There were also divers horns of the *Bos longifrons*, and, curiously enough, one of the vertebræ of a Saurian. The latter was a short distance off from the chief "find," and it was suggested that it might have been used as a hammer by some of the natives who brought it to the spot.

The portion of the "find" which caused most conjecture was, however, a fabric of stake and wattle. "I found one stake 2½ inches thick, and 2 feet long, lying close over the spot where we found most of the bones, but the fabric to which I now allude occurred some twenty-eight inches below the surface of the deepest part of the *mere*. The soil in the neighbourhood of it had been disturbed, so I took a spud and trowel and worked the thing out with my own hand. It resulted in an oval or egg-shaped structure of wattle, 5 feet 7 inches long, and 3 feet 10 inches wide. There were 14 uprights, varying from 2 to 2¾ inches in thickness, at nearly equal distances apart. Twigs and sticks were worked in these like the side of a very rough basket. At first I thought it might have been a sunken coracle, but on scooping out the clay with which it was filled, I found that the wattle ceased about 14 inches down, and that the uprights were merely stakes, from 21 to 27 inches long, driven originally into the chalk marl. The bottom of this fabric was filled with broken flints which were also found outside the lower part of the uprights and between them. The flints must have been put in, the points and edges of the points of the stakes being so sharp and clean that they could not have been driven through the bed of flints."

"The top of the wattle was on the level of the chalk marl, on which most of the bones, fragments of pottery, etc., were strewn, and which had been covered over to a depth of from 2 to 4½ feet of dark clay. No more stakes were found, but there occurred divers holes in the chalk marl, some of them nearly in line, in which we could not help thinking they might have once stood. Yet we found no remains of wood in these holes." (B. 161, p. 31.)

Professor Boyd Dawkins, under the heading "Habitations in Britain in the Bronze Age," writes as follows:—

"Sometimes, for the sake of protection, houses were built upon piles driven into a morass or bottom of a lake, as for example in Barton Mere, near Bury St. Edmund's, where bronze spear-heads have been discovered, one 13 inches long, among piles and large blocks of stone, as in some of the lakes in Switzerland. Along with them were vast quantities of the broken bones of the stag, roe, wild boar, and hare, to which must also be added the urus, an animal proved to be wild by its large bones, with strongly-marked ridges for the attachment of muscles. The inhabitants also fed upon domestic animals—the horse, short-horned ox, and domestic hog, and in all probability the dog, the bones of the last-named animal being in the same fractured state as those of the rest. Fragments of pottery were also found. The accumulation may be inferred to belong to the late, rather than the early, Bronze Age, from the discovery of a socketed spear-head. This discovery is of considerable zoological value, since it proves that the urus was living in Britain in a wild state as late as the Bronze Age. It must, however, have been very rare, since this is the only case of its occurrence at this period in Britain with which I am acquainted." ("Early Man in Britain," p. 352.)

LAKE-DWELLINGS IN THE FENLAND.

The discovery of so many submarine dwellings in Holland and the adjacent coasts of Germany which I have already described suggests that similar remains might be found in the Fens and other low-lying districts in Britain. The only reference, however, to such dwellings with which I am acquainted is the following short notice by Mr. Skertchly:—

"I detected the remains of one (lake-dwelling) at Crowland in the year 1870, during some excavations. The piles were of sallow planted very closely together, upon these was laid brushwood, and over this a layer of gravel. Immense quantities of bones, chiefly of the Keltic shorthorn, were found, together with a few bone implements, and a curious ornament of jet. Near Ely, stakes have been found in the peat, but they do not seem to belong to a lake-dwelling." ("The Fenland Past and Present," by Miller and Skertchly. 1878.)

PILE-STRUCTURES IN LONDON.

On December 18th, 1866, Col. Lane Fox (now General Fox-Pitt-Rivers) read a paper at the Anthropological Society entitled, "A Description of certain Piles found near London Wall and Southwark, possibly the Remains of Pile-Buildings."

The author commenced by observing that his attention was directed to this locality by a short paragraph in the *Times* of the 20th October, stating that upwards of twenty cartloads of bones had been dug out of the excavations which were being made for the foundations of a wool warehouse near London Wall. The excavation commenced at 40 yards south of the street pavement: therefore, in all probability, at about 70 or 80 yards from the site of the old wall. The area then excavated was of an irregular oblong form, 61 yards in length, running north and south, and 23 yards wide.

A section of the soil consisted of—

> "1. Gravel similar to Thames ballast at a depth of 17 feet towards the north, inclining to 22 feet towards the south end.
>
> "2. Above this, peat of unequal thickness, varying from 7 to 9 feet.
>
> "3. Modern remains of London earth composed of the accumulated rubbish of the city."

Between the bottom of the peat and the highest spring tide water-mark, as at present existing, there is a margin of 5 feet; but, of course, this might have been different in Roman times.

Regarding the remains of piles in this locality the author makes the following observations:—

> "Upon looking over the ground, my attention was at once attracted by a number of piles, the decayed tops of which appeared above the unexcavated portions of the peat, dotted here and there over the whole of the space cleared. I noted down the positions of all that were above ground at the time; and as the excavations continued during the last two months, I have marked from time to time the positions of all the others as they became exposed to view.
>
> "Commencing on the south, a row of them ran north and south on the west side, to the right of these a curved row, as if forming part of a ring.

Higher up and running obliquely across the ground was a row of piles, having a plank about an inch and a half thick and a foot broad placed along the south face, as if binding the piles together. To the left of these another row of piles ran east and west; to the north-east again were several circular clusters of piles; these were not in rings but grouped in clusters, and the piles were from eight to sixteen inches apart. To the left of this another row of piles and a plank two inches thick ran north and south. There were two other rows north of this and several detached piles, but no doubt several towards the north end had been removed before I arrived.

"The piles averaged 6 to 8 inches square; others of smaller size measured 4 inches by 3; and one or two were as much as a foot square. They appeared to be roughly cut, as if with an axe, and pointed square; there was no trace of iron-shoeing on any of them, nor was there any appearance of metal fastenings in its planks; they may have been tied to the piles, but if so, the binding material had decayed.* The grain of the wood was still visible in some of them, and they appear to be of oak. The planks averaged from one to two inches thick. The points of the piles were inserted from one to two feet in the gravel, and were, for the most part, well preserved, but all the tops had rotted off at about two feet above the gravel, which I conclude must have been the surface of the ground, or of the water, at the time these structures were in existence."

These relics were exclusively found in the peat or middle stratum (which varied from 7 to 9 feet in thickness), and "interspersed at different levels from top to bottom throughout it."

"Amongst the articles of human workmanship found in the peat the vast majority are undoubtedly of the Roman era. Amongst them are quantities of broken red Samian pottery, mostly plain, but some of it depicting men and animals in relief; one specimen is stamped with the name of Macrinus. All this pottery, in the opinion of Mr. Franks, to whom I showed it, is of foreign manufacture. Other samples are of the kind supposed to have been manufactured in the Upchurch Marshes in Kent, and upon the site of St. Paul's Churchyard. Bronze and copper pins, iron knives, iron and bronze stylus, tweezers, iron shears, a piece of polished metal mirror so bright that you may see your face in it (this Dr. Percy has pronounced to be of iron pyrites, white sulphuret of iron without alloy), an iron double-edged hatchet, an iron implement, apparently for dressing leather, a piece of bronze vessel, and other bronze and iron implements, which, thanks to the preserving properties of the peat, are all in excellent preservation. Amongst these were also a quantity of leather soles of shoes or sandals, some apparently much worn, and others, being thickly studded with hob-nails, may be recognised as the caliga of the

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* Towards the north the author subsequently found a "plank with several Roman nails in it; and the number of loose nails found in the soil above it showed that they must probably have belonged to some wooden superstructure which had perished."

Roman legions; also a piece of tile with the letters P. PR. BR. stamped upon it. Specimens of these are on the table. The coins found are those of Nerva, Vespasian, Trajan, Adrian, and Antoninus Pius. . . .

"In addition to the Roman relics above mentioned, others of ruder construction remain to be described. They consist of what, in the absence of any evidence respecting their uses, may be called handles and points of bone. The former are composed of the metacarpal bones of the red-deer and *Bos longifrons* cut through in the middle, and roughly squared at the small end; the others, which are called by the workmen spear-heads, are pointed at one end and hollowed out at the other, as if to receive a shaft. Both Professor Owen and Mr. Blake concur in thinking these implements may possibly have been formed with flint, but I cannot ascertain that they were found at a lower level than the Roman remains, nor have any flint implements, to my knowledge, been found in the place. With them were also found the two bone skates on the table; they are of the metacarpal bone of a small horse or ass, one of which has been much used on the ice. Exactly similar skates also of the metacarpal of the horse or ass have been found in a tumulus of the Stone Period at Oosterend in Friesland; a drawing of them is given in Lindenschmit's Catalogue of the Museum at Mayence, etc. Others have also been found in Zeeland, at Utrecht, and in Guelderland, and there is a specimen in the Museum at Hanover. Professor Lindenschmit attributes all these to the Stone Period, but the specimens on the table are evidently of the Iron Age, the holes in the back having been formed for the insertion of an iron staple. Similar skates have been found in the Thames, but they have not hitherto been considered to date so early in England as in Roman times."

Throughout the peat were several kitchen-middens. One, deposited a foot and a half above the gravel, is thus described:—"A layer of oyster and mussel shells about a foot thick, with a filtration of carbonate of lime permeating through the moss. In this kitchen-midden, Roman pottery and a Roman caliga were found. Close by, the point of a pile, part of which is exhibited, was found upright in the peat; it had been driven in in such a manner that the point descends to the level of the kitchen-midden and no farther. Now, as a pile, in order to obtain a holding, must have been driven at least two feet in the ground, it is evident the peat must have grown at least one foot above the summit of the kitchen-midden before this pile was driven in."

A second kitchen-midden is noted at a height of 3½ feet above the gravel, "composed of oyster, cockle, and mussel shells, and periwinkles, with Roman pottery and bones of the goat and *Bos longifrons*, etc., split lengthwise as if to extract the marrow, with the skulls broken and the horns cut off. It is about a foot and a half thick in the centre, thinning out towards the ends as a heap of refuse would naturally do, and from 12 to 14 feet long; above this is peat for about a foot or a foot and a half, and above the peat another kitchen-midden of the same kind as the preceding. Lastly, the soles of shoes and Roman pottery of the same kind as that found lower down have been taken out at the very top of the peat."

The distinguished investigator, being anxious to obtain further evidence as to the thickness of the stratum in which the Roman remains were found, states that he determined to watch the workmen for four or five hours together during several successive days, while they dug from top to bottom, commencing with the superficial earth, and passing through the peat to the gravel below. The result was as follows:—"Roman red Samian ware is found as high as 13 feet from the surface, but very rarely, and in small quantities. At 15 feet it is frequently found, and from that depth it increases in quantity till the gravel is reached at 18 to 21 feet. The chief region of Roman remains is within two or three feet of the gravel."

Amongst the animal remains were, according to Professor Owen, those "of the horse or ass, the red deer, the wild boar, the wild goat (*bouquetin*), the dog, the *Bos lonjifrons*, and the roebuck. The horns of the roebuck, I afterwards ascertained, were all found at a higher level. These, and also the horse and goat, entered the superficial earth, in which glazed pottery was also found; but the remainder, including the red deer, wild boar, and *Bos longifrons*, appeared, so far as my observations enabled me to judge, to be confined to the peat."

Subsequently Mr. Carter Blake identified amongst these osseous remains no less than four different kinds of the genus *Bos*—viz. *primigenius*, *trochoceros*, *longifrons*, and *frontosus*; as also a specimen of the ibex of the Pyrenees.

Some human skulls were found in the lowest formation of the peat, or immediately over the gravel. Along with these skulls only three other human bones were found; but this, according to the author, might not be the result of an oversight, as both the Celts and the Romans were known to have practised decapitation.

The piles at the south end were identified as elm, the remainder were oak (*Quercus robur*).

From the above carefully observed and recorded facts it will be observed that in addition to the primary piles which were inserted into the gravel there were others which did not penetrate so deeply, one having been carefully noted which terminated in the peat a foot and a half above the gravel. Facts precisely similar have been observed in almost all pile-dwellings whether on land or in water, showing that the elevations on which the platforms and huts were reared were successively renewed. Another conclusion which we are entitled to draw from the character of the relics and the conditions in which they were found is that in the low-lying districts of London the system of pile-dwellings was known in Britain in post-Roman times. Nor can it be said that this was a solitary instance, for similar remains were found in New Southwark Street, in regard to which the author writes as follows:—

> "The piles are of the same scantling, also of oak, but somewhat longer than those of London Wall; the points are driven into the gravel; the peat is three to four feet thick; large beams of the same size as the piles have been laid across them horizontally, and Roman pottery is found at all depths in the peat. Judging from the extent over which these piles have been discovered, there can be little doubt that in digging for the foundations of the many large warehouses and other buildings that are now being built within this district the remains of early habitations are constantly turning up and are destroyed without receiving attention."

As to the relics from these London pile-dwellings let me finally observe, that, to a certain extent, both in character and surrounding conditions they correspond with those from the Terp mounds in Holland and North Germany, from which it is probable the earliest Anglo-Saxon invaders hailed.

CRANNOG IN LLANGORSE LAKE, NEAR BRECON, SOUTH WALES.

Only one lake-dwelling has hitherto been recorded in Wales, viz. that of Llangorse. The partial exploration to which it has been subjected was undertaken by the Rev. Mr. Dumbleton, and the results are recorded by him in the *Archæologia Cambrensis* for 1870 and 1872. (B. 173.) The following extracts from these reports clearly show that the island was entirely artificial and constructed after the manner of the Scottish and Irish crannogs. Its structural features were well seen in the surrounding stockades and log-floorings, while the heaps of charcoal, remains of food-refuse, and other indications point to a prolonged period of human occupancy. Mr. Dumbleton states that until about seven years ago, when the lake was artificially lowered a foot and a half, this island was not half its present size. He then advances various evidences to show that formerly the level of the water was still lower, when, therefore, the island would have been larger than now. This opinion may be, and probably is, correct; but we must remember that another factor has to be taken into account when discussing the invariable submergence of these islands, viz. their own pressure on a yielding lake sediment, together with the decay of the brushwood and other organic materials which generally formed their under strata. It is to be regretted that no relics were found on this island, and I cannot help thinking that, in the circumstances, a more careful search would have furnished some scraps of the handiwork of its occupiers. From the description it is clear that metal tools were used in manipulating the woodwork, but otherwise, and in the absence of any historical notice, we have no means of determining either the age of this singular lacustrine abode or the social condition of its inhabitants.

"Immediately beneath the southern spurs of the Black Mountains, and in the hollow of the great geological fracture which parts that chain from the Brecknockshire Beacons, is situated a sheet of water now called the Lake of Llangorse. Its name was formerly Llyn Savathan, or the lake of the sunken land. The area of water was once far more extensive than it is now; and it has subsequently been, as I think, considerably less than at present. A circuit of five miles will now enclose it. The margin is flat and swampy, except on the north-east, where the mountain descends upon the shore-line somewhat abruptly. The depth, though by vulgar report vast and fearful, Leland has rather overstated in assigning to it thirteen fathoms."

"Within a bow-shot of the flat meadows on the north side there is an island that would appear but little above the water, were it not for some small trees and brushwood that have fastened upon it.

"Sailing by the island one day in 1867, I observed that the stones which stand out on the south and east sides were strangely new looking, and most unlike the water-worn, rounded fragments that on the main shore have been exposed to the action of the waves; neither did there seem to be any original rock-basis at all. It was, in fact, nothing less than a huge heap of stones thrown into water two or three feet in depth. Was this the key, I thought, to the old tradition of a city in the lake? In the summer of last year, my brother, then living in the neighbourhood, first discovered a row of piles or slabs; some standing a few inches above water, for the lake was very low. We have together made some investigations during the past month, the results of which I will detail.

"The island, as now above water, measures 90 yards in circumference, its form being that of a square with the corners rounded off. The highest part is nearly in the centre, and is 5 feet above the water-level. The sides most exposed to weather, where also the water is deepest, are composed of stones sloping into the water, and extending to the distance of fifteen yards from the edge. Under the water, however, they are not nearly so thickly strewn as above. It is remarkable that on the leeward or northern side, about one quarter of the island is almost destitute of stone protection with which the greater part is covered. There is simply a surface of vegetable mould, inclined towards the water. Neither in the water, which is there very shallow, are there more than a score of stones to be found on that side. I must now speak of the piles. These are of two sorts, the most obvious being either at the margin or within a few feet of it. Like the stones, they are most numerous where the action of the storm would be most felt, and upon the shallow side they disappear entirely. They have been disposed in segments of circles, the stones being heaped inside them, and thus saved from being torn away by the waves. These piles (or rather slabs) are of cleft oak, and have been pointed, as it seems, by cuts from a metal adze. We have counted about sixty. They have been driven tightly into the shell-marl, to the depth of four feet. There are also other piles, which are round, generally of soft wood, and are found outside the present edge of the island. Several are in water two feet deep, and are driven into the marl only twelve or eighteen inches. These would have been quite powerless to confine the stones, and were evidently for another purpose. . . . Is it not likely that the island itself was central common ground? and that the habitations were projected from its edge towards the water and were supported by these thick round piles? Something like a ring of these is found near the oak slabs before mentioned; and traces of a second set are at the distance of twelve or fifteen yards, in water about two feet deep. Between the two, small wood is found abundantly, a few inches in the marl. At about ten yards from the shore, and in two feet of water, there appear to be the actual remains of a sunken platform. Three trunks of soft wood lie nearly parallel to one another. A 6 feet stem of oak, which I cannot account for, was with them. The top of this we sawed off, as it exhibits the marks of some heavy cutting instrument where, in modern days, a saw would have been used.

"I have to add to this subject the discovery of two much more perfect platforms in a perplexing situation, namely, within the oak slabs. They were composed of eight straight trunks, about six inches in diameter, lying side by side. Their direction is from the centre to the water; their ends, towards the shore, are thrust against the slab piles; others are closed in one case by a transverse oak beam. . . .

"The examination of the interior would, of course, unfold the process of the construction. We therefore made several perpendicular openings; and these invariably led us down to the shell-marl, showing first a stratum of large, loose stones, with vegetable mould and sand; next (about eighteen inches above the marl), peat, black and compact; and beneath this, the remains of reeds and small wood. This faggot-like wood presented itself abundantly all round the edges of the island, and in the same relative position, namely, immediately upon the soft marl; the object of it being, of course, to save the stones from sinking.

"On digging through the before-mentioned low portion of the crannog a different order of materials exhibited itself. As I said, the stones are very few; the depth is 3 feet instead of 5; 18 inches of vegetable mould; 6 inches of earth mixed thickly with charcoal; and 1 foot of peat, small wood or reeds. I may here say that this charcoal is found under water, in very frequent small fragments, on this north-eastern side; and is covered, not with marl or stones, but with sand. Bones are found in numbers amongst the stones where the water is quite shallow; every spadeful of marl, in some parts, would, as the water dripped off, show one or more small bone fragments or teeth."

The osseous remains were more or less identified by Professors Owen, Rolleston and Boyd Dawkins as belonging to *Bos longifrons*, horse (small and large variety), red deer, and wild boar.

LAKE-DWELLINGS IN BERKS, ETC.

In 1878, Professor T. Rupert Jones, F.R.S., communicated to *Nature* a short notice of "English Lake-Dwellings and Pile-Structures," in which, after drawing attention to the previously published articles of General Lane Fox and Sir Charles Bunbury, he writes as follows:—

"Since writing the above I have been informed that Mr. W. M. Wylie, F.S.A., referred to this fact in *Archæologia*, vol. xxxviii., in a note to his excellent memoir on lake-dwellings. I can add, however, that remains of *Cervus elaphus* (red deer), *C. dama?* (fallow deer), *Ovis* (sheep), *Bos longifrons* (small ox), *Sus scrofa* (hog), and *Canis* (dog), were found here, according to information given me by the late C. B. Rose, F.G.S., of Swaffham, who also stated in a letter dated August 11th, 1856, that in adjoining meres, or sites of ancient meres, as at Saham, Towey, Carbrook, Old Buckenham, and Hargham, cervine remains have been met with; thus at Saham and Towey, *Cervus elaphus* (red deer); at Buckenham, *Bos* (ox) and *Cervus capreolus* (roebuck); at Hargham, *Cervus tarandus* (reindeer).

"The occurrence of flint implements and flakes in great numbers on the site of a drained lake between Sandhurst and Frimley, described by Captain C. Cooper King in the *Journal of the Anthropological Institute*, January, 1873, p. 365, etc., points also in all probability to some kind of lake-dwelling, though timbers were not discovered.

"Lastly, the late Dr. S. Palmer, F.S.A., of Newbury, reported to the Wiltshire Archæological Society in 1869 that oaken piles and planks had been dug out of boggy ground on Cold Ash Common, near Faircross Pond, not far from Hermitage, Berks." (B. 312, p. 424.)

The following is Dr. Palmer's notice of the pile-structures at Cold Ash Common above referred to:—

"Recurring to the antiquities of the peat proper, I would refer to the subject of lake-dwellings. I do not despair of finding them in our neighbourhood, for I believe traces of them have been found near Cold

Ash, some such structure having been uncovered in digging bog-earth for horticultural purposes. It was circular, measuring 30 feet across, and the planks were 16 to 18 feet in length, roughly hewn, and with beams crossing from side to side, and resting on the piles. There was also a kind of causeway to it. It was on the borders of a morass, the resort of wild fowl within the memory of man. The general appearance of the valley at this place leads me to surmise that it was not long since covered with water; there is still a pond in the centre. The bog-earth had been carted away before I heard of the discovery, so that I had no chance of examining it for animal or other remains."

The editor of the *Transactions of the Newbury District Field Club* adds the following note to the above extract.—

"Mr. Walter Money, F.S.A., has gathered some information about this interesting relic of the past. It is situated on a part of what was Cold Ash Common . . . and has long been known as 'Wild Duck Pond;' it is now an oval piece of water, not much more than 20 feet across, surrounded by arable land.

"About thirty years ago, before the Common was enclosed, the season being dry, the 'Wild Duck Pond' was cleared by Mr. Whiting, of Long-lane Gate, who thought the accumulated soil or mud might be useful on the land. After the removal of the top soil, some rough timber framing was met with, lying across the centre of the pit, forming, it would seem, a rude platform. A space was cleared about ten feet deep, where a heavy log of oak was found lying across from side to side. This was not removed. The work was then abandoned; the soil taken out being found to be of no use to the land. About thirteen years ago, the excavation was repeated by Mr. Lancaster, the then tenant of this part of Col. Loyd-Lindsay's property; but the investigation was not pursued far, and the water having flowed into the digging, 'Wild Duck Pond' was again restored nearly to its former condition." (*Trans. of Newbury District Field Club*, vol. ii. p. 148.)

Remains suggestive of a pile-structure were also observed by Mr. Dolby in 1870 in one of the ponds at Fence Wood, near Hermitage. Here in digging they found "a sort of pyramidal dwelling beneath the ground,' the roof being covered with clay about a foot thick. This roof was supported by a large piece of timber, some twenty-six feet long, which they had got out. There were causeways there also at a depth of fifteen or sixteen feet. The water had long since rushed in and filled up the excavation, so that nothing further is known of this place." (*Ibid.*, vol. i. p. 123.)

LAKE-DWELLINGS IN HOLDERNESS, COUNTY OF YORK.

The discovery of lake-dwellings in Holderness is due to Mr. Thomas Boynton, Bridlington (lately of Ulrome Grange), whose attention was first directed to the subject in the spring of 1880. Previous to the excavation of a great drainage scheme about the beginning of the present century this district appears to have been intersected by a series of sinuous and irregularly shaped lakes, whose surplus waters partly found an outlet, not in the present artificially constructed channels which convey them directly into the German Ocean, but in quite a different direction, along a sluggish watercourse, still extant, which falls into the Humber near Hull. That this latter was in former times the natural drainage course of the entire waters of Holderness is the opinion of Mr. Boynton and other geologists with whom I had the pleasure of discussing the matter. Mr. G. W. Lamplugh believes that the Gypsey Race—a stream which now enters the sea at Bridlington—at some former period continued its course through this chain of lakes and finally debouched by the same route into the Humber. The natural causes which have effected this great change in the hydrographical conditions of Holderness are to be found in the steadily progressing encroachment of the sea on the land, which here goes on at a very rapid rate. When the sea lay many miles farther off, which undoubtedly was the case in former times, it is supposed that the intervening land stood somewhat higher, and that consequently Holderness was a complete water-basin, with its outlet towards the Humber. But as the sea advanced, gradually undermining and washing away the soft glacial deposits which here form its shores, this natural basin became, as it were, tapped in the middle and so allowed the waters of its upper reaches to escape directly into the sea—a process precisely analogous to that by which its final drainage was effected by human agencies.

Nor is this opinion based exclusively on geological considerations, as we have positive historical proofs in the early annals of the country that formerly towns existed whose sites are now far out in the sea. Thus Mr. Poulson ("History of Holderness," p. 467) states that "the writer of the chronicle of the Abbey of Meaux, in lamenting the losses which the abbey had sustained, observes that they received nearly £30 from the town of Hythe, in the parish of

Skipsea, chiefly from the tithe of fish; but now, says he, 1396, *the place is totally destroyed*—a proof that it was gone into the sea before the commencement of the fifteenth century." The lake of Withou, which is recorded as having paid tithe for its fish in 1288 (*Ibid.*, 468), is not only at present completely drained, but more than half of its bed is washed away, and the sea beach, which runs right across it, presents a most instructive section of its sedimentary deposits and subsequent growth of peat.

From these remarks it will be seen that, in estimating the precise physical conditions that prevailed when the lacustrine abodes I am now about to describe were constructed, we have to deal with problems of a somewhat discursive character, and which, consequently, lie beyond the scope of this work. It is clear, however, that, previous to its artificial drainage, the district was overspread with a succession of shallow lakes and marshes, pre-eminently well adapted for the construction of lake-dwellings. The lakes are now gone and instead of them we have artificial drains winding along the lowest portions of their former beds. It is along the steep banks of these sluggish water-channels that Mr. Boynton has detected, in various places, piles and transverse beams, which he justly considers to be the remains of ancient lake-dwellings. Up to the present time indications of five stations have been observed, which for facility of reference the discoverer names as follows—(1) West Furze, (2) Round Hill, (3) Barmston, (4) Gransmoor, and (5) Little Kelk.

These are situated at considerable intervals from each other, varying from half a mile to two or three miles, and as they are deeply buried their investigation entails a considerable amount of labour and expense. It is only the stations at West Furze and Round Hill that have as yet been subjected to anything like a systematic exploration. A few years ago Mr. Boynton at his own expense carried out a series of excavations at the former station by which its character has been satisfactorily determined, and subsequently he has undertaken to examine the second with a grant from the Society of Antiquaries; but these works are not yet completed, and at present they are entirely suspended owing to the volume of water in the drain.

I may state that I have on several occasions visited the locality and so became practically conversant with the general features of these discoveries. Moreover, for the special object of this work, Mr. Boynton has freely placed all the materials in his possession at my disposal and given me permission to add to my notes the accompanying illustrations of a few of the more interesting objects.

West Furze.—This was the first discovered, and the circumstances that led to the discovery are thus described by Mr. Boynton (B. 373, p. 300):—

> "In the spring of the year 1880 the Commissioners of Beverley and Barmston Drainage found it necessary to deepen one of these drains (the branch called the Skipsea drain).
>
> "A short time after this was done I was walking in one of my fields adjoining, and picked up some perforated bone implements. I shortly afterwards had the earth, which had been excavated at this place, turned over, and found more implements of the same class. Also two made from the antlers of the red-deer, and a small piece of red ochre, with several stones which bear traces of having been utilised.
>
> "In the month of May, 1881, the water in the drain at that time being very low, and having obtained the services of half a dozen men accustomed to similar work, I had the water dammed, and dug through peat to a bed of gravel, 9 feet 6 inches from the surface.
>
> "We found three more perforated bone implements, all in the side of the drain, and at the depth of 7 feet, also several stakes and piles with remains of brushwood. I then determined, when opportunity offered, to excavate in the field, and proceeded to do so in December last (1881). We commenced by digging a trench parallel with the drain and 60 feet in length. This trench and the drain formed two sides of a square, running north and south."

Subsequently Mr. Boynton cleared out the entire enclosure thus marked out by these primary trenches and found the whole of it to be occupied with an artificial structure of wood like the so-called fascines of Switzerland or the crannogs of Scotland and Ireland. The depth of decayed brushwood was very considerable, and it was pierced here and there with upright piles. At the margin these piles were thicker, and in one place, the south-east corner, he states that they met with great "numbers of stakes, with some brushwood, the earth being a peaty marl." Further progress from this point is thus described:—

> "When clear of the slope there is a decided layer of brushwood about two feet thick, also studded with stakes, and along the inner side of the south trench we found a number of piles from 5 to 7 inches in diameter, in a line, and mostly upright. One of these we got out quite perfect. It

is of oak wood, 4 feet in length, 6 inches in diameter, and has a forked top which has apparently been intended for carrying a horizontal beam or support. The piles are about 4 feet apart. One had given way and had been replaced.

"As the trench is not exactly in a line with the piles, several are now left standing and partially exposed. In this portion of the digging we found several bones of animals, a peculiar grinding-stone of whinstone or granite, almost semicircular in shape, 12 inches long by 7 broad, a flint core, a stone with the centre hollowed, a hammer-stone, and two fragments of rude pottery.

"Hazel-nuts are numerous; several I have picked out appear to have been opened by squirrels."

The drain appears to have intersected the woodwork, and as the excavations were confined to one side, the exact dimensions of the lake-dwelling cannot be stated. Its length was approximately about 70 feet, and its breadth probably one-third less. On my first inspection of the locality after these excavations had been completed I was struck with the narrowness of the lacustrine area in which the structure was reared. From the nature of the adjacent ground it was readily seen that the lake widened very considerably both above and below; but here it was so contracted that the woodwork appeared to occupy the entire breadth of the waterway—a fact which suggested to me the idea of its being a bridge or military stronghold. However, on closer inspection I saw that the accumulation of rain-wash had considerably encroached on the original bed of the lake, and I am satisfied that there would be, in former times, sufficient space for giving to the dwelling a complete insular character.

The following relics, now in the possession of Mr. Boynton, were collected in the course of the investigations:—

Horn and Bone.—The perforated bone implements (**Fig. 176***a*, Nos. 1 and 2), of which not less than eighteen were collected, are the most remarkable objects. They all consist of the articulate extremities of the long bones of some large bovine animals, with the exception of two, one of which was the thick end of a scapula and the other a cervical vertebra. The latter was not manipulated, and the reason it is here classified as an implement is that a portion of a wooden handle, which had been inserted into the spinal aperture, still remained. In this manner the vertebra became a formidable weapon, which, when used as a club or skull-cracker, could scarcely be matched by any work of art. I am of opinion that all these perforated bone implements were simply warlike weapons. Three handpicks, made from the horns of the red deer—the brow antler forming the pick and the body of the horn, stripped of its antlers, the handle. Also a club, or broken pick, and several portions of worked tines.

Stone.—Three hammer-stones of natural pebbles; two anvils, one flat and circular and the other having a slight cavity on one side; six polishers, or rubbers; two flint cores, and about 50 substantial-looking flakes. One flake was a good example of a knife, and showed evidence of having been used; three other flakes were secondarily chipped and converted into neat scrapers and a saw (No. 3).

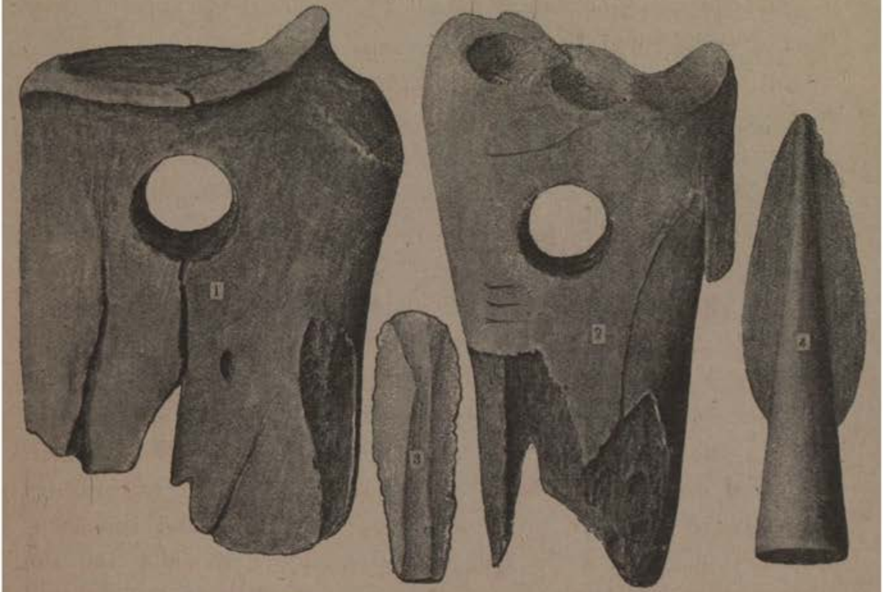

Fig. 176*a*.—Holderness. All ½ real size.

Bronze and Jet.—One bronze spear-head (No. 4), and a fragment of a jet arm-band, like those from the Ayrshire crannogs.

Pottery.—Fragments of a coarse unornamented pottery were found, out of which one vessel has been restored, having the following dimensions:—11 inches wide at mouth; 12 inches in the widest, a little below the mouth; and 7½ at base. Height, 7½ inches.

About thirty yards distant from the lake-dwelling, in a peaty hollow in the field, Mr. Boynton found pottery of a similar character. It was buried about three feet in the peat. The depth of peat over the lake-dwelling was somewhat more, being nowhere less than 4 feet.

Fauna.—No expert has as yet made a report on the osseous remains, but they are believed to represent the following animals:—*Bos longifrons* and *primigenius*, horse (a small breed), dog or wolf, beaver, ox, pig, sheep or goat, deer, otter (?), goose, and some small birds.

One well-formed human skull, with portion of an upper jaw.

ROUND HILL.—So far as the excavation of this station has been prosecuted the woodwork appears to have been precisely similar to the former, but the area occupied is of larger dimensions. Mr. Boynton thinks that the piles here belong to different periods of time, and a curious fact which he pointed out to Canon Greenwell and myself seems to support this view. He showed us the point of one pile which had penetrated and terminated in the stump of another, from which he inferred that before the former had been inserted the latter had already been in a state of decay. The decayed brushwood had also a greater thickness than at West Furze. The station has not, however, yielded many relics, the principal objects being a small stone celt, portion of a perforated stone hammer, and the half of a jet bracelet. The latter appears to be unique. It is of a flattish form, and ornamented on its outer side by five prominent ridges, running circularly. The marginal ridges are separated from the three central ones by a wider interval, in which runs a smaller ridge or bead. These ridges were evidently manipulated without the use of a turning machine, as they are not perfectly uniform, though the artist's intention was to make them so.

In regard to the other three stations there are only indications of their being of a similar character, such as piles and transverse woodwork along the bottom and sides of the drain. At Barmston, a stone axe, a perforated bone implement, like those from West Furze, and bits of charcoal were found. At Gransmoor a very large quantity of broken bones lay exposed in the bottom of the drain, amidst a profusion of oak piles and beams, but among them no implements have been found.

IV.—GENERAL REMARKS ON THE LAKE-DWELLINGS OF GREAT BRITAIN AND IRELAND.

Having placed before you, with a considerable amount of fullness, certain details of the investigations of ancient lake-dwellings that have been made within the British Isles during the last half century, I proceed now to the discussion of some facts bearing on the ultimate question of their origin and development. As my conclusions are of a somewhat argumentative character, involving the consideration of some collateral phenomena as well as a critical analysis of the special materials derived from archæological research, it will be advisable, in order to secure, as far as possible, precision, at least in methods, to concentrate attention on a few definite problems—convenient foci as it were for grouping my observations. I propose accordingly to deal successively with their structural peculiarities; their range in space and time, and how far this range coincides with ethnography; and, finally, their relation to analogous remains in Europe.

Except in a very few instances, which will be afterwards more specially referred to, all the lake-dwellings hitherto examined in Great Britain and Ireland were constructed on artificial islands made generally of wood, but sometimes of stones and such other materials as might be considered suitable. Although no such instructive examples as those at Lochlee, Buston, etc., have been recorded in Ireland, there can be no doubt that those of the latter country were built on the same general principles. Indeed, few of the writers on Irish crannogs have paid much attention to the structure of the islands, and, beyond the mere statement that they were stockaded, palisaded, or surrounded by one or more circles of piles, they have supplied no explanation of the attachments and proper function of the surrounding piles. But though the purpose of the mortised beams does not appear to have been at first well understood in Ireland, it is of importance to observe that their existence has not been entirely overlooked. Dr. Reeves, writing of a crannog in the county of Antrim, says: "These piles were from 17 to 20 feet long, and from 6 to 8 inches thick, driven into the bed of the lough, and projecting above this bed about 5 or 6 feet. They were bound together at the top by horizontal oak-beams, into which they were mortised, and secured in the mortise by stout wooden pegs." (*Proc. R. I. A.* vol. vii. p. 155.)

Mr. G. H. Kinahan in a paper on the crannogs of Lough Rea thus incidentally alludes to the subject:—"A little north-west of the double row, in the old working, there is a part of a circle of piles; and in another, a row of piles running nearly east and west. Mr. Hemsworth of Danesfort, who spent many of his younger days boating on the lake, and knows every part of it, informs me that on the upper end of some of the upright piles there were the marks of where horizontal beams were mortised on them. These seemed now to have disappeared, as I did not remark them." (*Ibid.*, vol. viii. p. 417.)

These are by no means isolated observations on this point, and when we consider how readily the exposed woodwork of an uninhabited crannog would be destroyed, either by the hand of man or the natural processes of decay, we need not wonder that it is only the stumps of the piles and generally submerged portions of these singular structures that remain to the present day.

The construction of a crannog must have been a gigantic operation in those days, requiring in many cases the services of the whole clan. Having fixed on a suitable locality—the topographical requirements of which seemed to be a small mossy lake, with its margin overgrown with weeds and grasses, and secluded amidst the thick meshes of the primæval forests—the next consideration was the selection of the materials for constructing the island. In a lake containing soft and yielding sediment of decomposed vegetable matter, it is manifest that any heavy substances, such as stones and earth, would be totally inadmissible, owing to their weight, so that solid logs of wood, provided there was an abundant supply at hand, would be the best and cheapest material that could be used.

The general plan adopted was to make an island of stems of trees and brushwood laid transversely, with which stones and earth were mingled. This mass was pinned together, and surrounded by a series of stockades, which were firmly united by intertwining branches, or, in the more artistically constructed crannogs, by horizontal beams with mortised holes to receive the uprights. These horizontal beams were arranged in two ways. One set ran along the circumference and bound together all the uprights in the same circle, while others took a radial direction and connected each circle together. Sometimes the latter were long enough to embrace three circles. The external ends of these radial beams were occasionally observed to be continuous with additional strengthening materials, such as wooden props and large stones, which, in some cases, appeared also to have acted as a breakwater. The mechanical skill displayed in their structure was specially directed to give stability to the island and to prevent superincumbent pressure from causing the general mass to bulge outwards.

South of the Scottish border the remains of lake-dwellings are too much decayed or imperfectly observed to furnish many reliable data bearing on this subject. So far, however, as the evidence goes it would appear that the artificial island in Llangorse and the lacustrine dwellings in Holderness were true fascines; the former, indeed, having all the appurtenances of the typical crannog.

The crannogs were made accessible by various means. Some had moles or stone causeways, the existence of which, in some instances, became known only upon the drainage of the lake. Hence it is conjectured that these approaches might have been always submerged, and so supplied, on emergencies, a secret means of communication with the shore. This idea was suggested by the tortuous direction which many of them assumed, as for example the causeway discovered in the Loch of Sanquhar which had a zig-zag direction and so could only be waded by persons intimately acquainted with its windings. Others were approached by a wooden gangway, the evidence of which now consists only of the stumps of a double row of piles. Others again were completely insulated and accessible only by boats. One feature regarding some of the wooden gangways deserves particular attention. Both at Lochlee and Lochspouts the piles were found to be tightly embraced at their lower extremities by a curiously constructed network of transverse beams. As the surface of these elaborate structures was buried from 3 to 7 feet beneath the lake-bed, my first impression was that they might have been used, like the submerged stone causeways, as a concealed means of communicating with the shore. To test this suggestion I had a special excavation made along the line of a gangway at the Miller's Cairn in Loch Dowalton. (B. 426, p. 102.) After digging through 3 feet of the consolidated and hardened mud, we came upon a stratum of fine blue clay, extremely tenacious, and little liable to displacement. The pointed stakes of the gangway, which penetrated into this clay only a few inches, here met with a firm resistance. It then occurred to me that the ingeniously arranged wooden beams at Lochlee and Lochspouts served merely the same end as the blue clay at the Miller's Cairn, and that they were to be found only in localities where there was a great depth of mud incapable ot affording a sufficient basis of resistance to the piles. Such difficulties have been encountered by the constructors of pile-dwellings in all countries; and it is curious to note the variety of methods by which they were overcome. The Swiss lake-dwellers sometimes surrounded the piles with heaps of stones which now go under the name of *steinbergs;* at other times split planks were laid on the soft mud into which the piles were mortised. The former plan was adopted on rocky shores too hard for piles to be driven in, and the latter where there was a great depth of soft mud, as at Wollishofen and other stations adjacent to the town of Zürich. In North Germany, as Persanzig, Aryssee, and other localities, the log-house principle, which greatly economised the materials, was adopted in the construction of the subaqueous foundations. It appears to me that this was the principle adopted in the structure of the great Irish crannog of Lagore, as Sir W. Wilde distinctly states that it was "divided into separate compartments by septa or divisions that intersected one another in different directions." It was in these compartments, which were filled with bones and black mud, that the antiquities were found; so that the crannog-dwellers must have used them as kitchen-middens. Originally they contained only water, but in the course of time they became filled with food refuse and other *débris.* House-cleaning was thus reduced to a minimum, while the laws of sanitation were not more violated than in the underground cess-pools of many of our modern dwellings. A curious statement by Wilde in regard to the disposal of bones at Lagore is that "the remains of each species of animal were placed in separate divisions, with but little intermixture with any others."

It may be also mentioned that the log-house structures described by Pigorini as lining the inside of the surrounding dyke in the terramara of Castione were perfectly analogous, only in this case the compartments were filled with clay and rubbish, so as to act better as *contraforte* to the clay wall.

Canoes are so invariably found associated with crannogs that their discovery in lakes and bogs has been considered by Dr. Stuart as an indication of the existence of the latter. This may be true in some cases; but in others, such as Closeburn, Lochwinnoch, and Loch Doon, three of the examples cited by him, it is more probable that the canoes were used by the occupiers of the mediæval castles in the vicinity of which they were found. From these and other instances that have come under my notice I have come to the conclusion that dug-out canoes do not indicate such great antiquity as is commonly attributed to them, nor do they therefore necessarily carry us back to prehistoric times.

There is no peculiarity in the structure or form of these dug-outs which distinguishes their age or nationality. There is a good collection of them in the Museum of the Royal Irish Academy. Some have pointed prows and square-cut sterns; others have both ends pointed; some have cross bands, like ribs, left in the solid oak at regular intervals, as if to strengthen the vessel; while others are uniformly scooped out without any raised ridges. They vary much in size and shape. The largest is thus referred to in the small handbook to the Museum:—"Down the centre of the room extends the largest known canoe, formed of a single tree. The remains measure 42 feet in length, and the canoe was probably 45 feet long, by 4 to 5 feet wide, in its original state. It was recovered from the bottom of Loch Owel, in West Meath, and cut into eight sections for purposes of transport. There is a curious arrangement of apertures in the bottom, apparently to receive the ends of uprights supporting an elevating deck."

One of the canoes found at Lochlee, the remains of which are still preserved in the Burns' Museum at Kilmarnock, measured when disinterred 10 feet long, 2½ broad, and 1¾ deep. There were nine apertures in its bottom, arranged in two rows, four on each side, with the odd one at the apex. These holes were perfectly round, and exactly one inch in diameter; but when the boat was found they were quite unobserved, being all tightly plugged up, and it was only long afterwards that the plugs, upon drying, dropped out and so revealed their existence.

During the summer of 1874 a canoe (**Fig. 177**) was discovered in Loch Arthur, or Lotus Loch, in the stewartry of Kirkcudbright, in the vicinity of a small artificial island, which is thus described by Rev. James Gillespie:—

"When fully exposed to view by the trench which was dug around it, the canoe was seen to be of great size, orhately finished, and in a fair state of preservation. It had been hollowed out of the trunk of an oak, which must have been a patriarch of the forest, the extreme length of the canoe being 45 feet and the breadth at the stern 5 feet. The boat gradually tapers from the stern to the prow, which ends in a remarkable prolongation resembling the outstretched neck and head of an animal. When excavated this portion of the canoe was entire. At the neck of the figurehead there is a circular hole, about 5 inches in diameter, from side to side. At the prow a small flight of steps has been carved in the solid oak from the top to the bottom of the canoe. The stern is square, and formed of a separate piece of wood, inserted in a groove about an inch and a half from the extremity of the canoe.

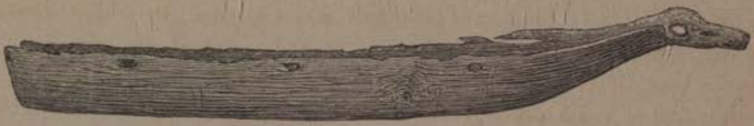

Fig. 177.—Forward half of the Canoe found in Loch Arthur.

"Along the starboard side (which when found was in good preservation, except near the stern) there could be traced seven holes about three inches in diameter. The three front holes were nearly perfect, but at the stern the side was so broken that only the lower parts of the holes could be observed. They are about five feet apart, and the front hole is about that distance from the prow—the last being about seven feet from the stern. There are three holes pierced through the bottom at irregular intervals." (*Proc. Soc. Antiq. Scot.*, vol. xi. p. 21.)

A curious feature presented by some of these canoes was that accidental defects had been repaired, and the method adopted in its execution is worth noticing. The canoe found close to the Buston crannog already described (page 428), showed this peculiarity in a marked degree. Another from the Loch of Canmor is thus described by the Rev. James Wattie:—

"On the 16th June, 1859, there was fished up from the bottom of the loch, near the north shore, opposite to the Prison Island, a canoe (**Fig. 178**) hollowed out of a single oak-tree, 22½ feet long, 3 feet 2 inches wide over the top at the stern, 2 feet 10 inches in the middle, and 2 feet 9 inches at 6 feet from the bow, which ended nearly in a point. The edges are thin and sharp, the depth irregular—in one place 5 inches, the greatest 9 inches. There are no seats, nor rollocks or places for oars; but there may have been seats along the sides, secured by pins through holes still in the bottom. There are two rents in the bottom, alongside of each other, about eighteen feet long each; to remedy these, five bars across had been mortised into the bottom outside, from 22 to 27 inches long and 3 inches broad, except at the ends, where they were a kind of dovetailed, and 4 inches broad. One of these bars still remains, and is of very neat workmanship, and neatly mortised in. The other bars are lost, but their places are quite distinct. They have been fastened with pins, for which there are five pairs of holes through the bottom of the canoe, at the opposite side, at a distance of from 18 to 20 inches, the bottom being flattish. There are also five pairs of larger holes through the bottom, etc." (B. 94, p. 167.)

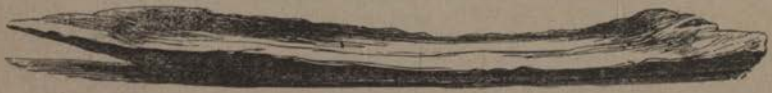

Fig. 178.—Canoe found in Loch Canmor.

Exact parallels to all these have been found in the Continental lake-dwellings. Of two found at Vingelz, Lake of Bienne, the largest was 43½ feet long, 4 feet 4 inches wide, and had 4 ribs left in the solid. It had iron cramps also, apparently to strengthen it, and belonged to the pre-Roman Iron Age. One at Cudrefin had also these solid cross ribs. One of the best preserved was found a few years ago at Vingrave (Lake of Bienne) covered with 2½ feet of mud, and is now deposited in the Museum of Neuveville. It is roughly made, having thick sides and a square-cut stern, with a groove for a movable stern-piece. From measurements lately taken by myself I found it to be 30½ feet long, rather less than 3 feet wide, and its greatest depth 1 foot. Its sides had four or five cuts along their margin, apparently for the use of oars. (B. 392, p. 20.)

That the crannogs in Scotland and Ireland lingered on sufficiently long to come within the borderland of history requires no great amplification here. The references to crannogs in the Irish annals are very numerous, extending over a period from the middle of the ninth to the seventeenth century.

In 1870 there was published in the *Journal of the Royal Historical and Archæological Association of Ireland* (B. 171*a*) an account of an unsuccessful attack on a crannog near Omagh, in the year 1566, by an English army under the command of Deputy Lord Sydney.

This document, which was copied by Dr. Caulfield from despatches in the Public Record Office, London, gives a vivid description of the methods adopted in the attack and defence. A kind of pontoon was constructed on "floating barrels," which conveyed the attacking party to the island; but they found it "so bearded with stakes and other sharp wood, as it was not without extreme difficulty scaleable, and so ramparted as if the hedge had been burned—for doing whereof the fireworks failed—without a long time it was not to be digged down. Yet some scaled to the top, whereof Edward Vaughan was one, who, being pushed with a pike from the same, fell between the hedge and the bridge, and being heavily armed—albeit he could swim perfect well—was drowned, and two others hurt upon the rampart and drowned," etc.

That these island forts, however impregnable they might be considered in previous ages, had ultimately to succumb before the more modern resources of warfare, is shown by the following narrative taken from the Calendar of State Papers of Ireland, vol. 156, p. 374:—

> "There was one Dualtagh O'Conner, a notorious traitor, that of all the rest continued longest as an outlaw, of power to do mischief. He had fortified himself very strongly after their manner in an island or crannoge within Lough Lane, standing within the county of Roscommon and on the borders of that country called Costelloghe. A few days ago, as opportunity and time served me, I drew a force on the sudden one night and laid siege to the island before day, and so continued seven days, restraining them from sending any forth or receiving any in, and in the meantime I had caused divers boats from Athlone and a couple of great iron pieces to be brought against the island, and on the seventh day we took the island, without hurt to any on our side, save my brother John, who got a bullet-wound in the back. When our men entered the island there was found within it 26 persons, whereof 7 were Dualtagh's sons and daughters; but himself and 18 others, seeking to save themselves by swimming, and in their cot to recover the wood next the shore, were for the most part drowned. Some report that Dualtagh was drowned, but the truth is not known. It was scarce daylight, and the weather was foggy when they betook themselves to flight. The Irishry held that place as a thing invincible."—Sir R. Bingham to Burghley, Dec. 16th, 1590.

In addition to the historical evidence we have that of the relics found on many of these crannogs, which includes iron pots, guns, leaden bullets, coins, etc. Thus associated with two crannogs in Lough Annagh were an iron cuirass, matchlock guns, pistols, antique keys, spurs, various implements of iron, a bronze ladle, bronze spearhead, etc. (B. 149, p. 156.)

To the literary researches of the late Dr. J. Robertson we are indebted for equally explicit historical notices regarding the Scottish crannogs:—"Among the more remarkable of the Scottish crannogs is that in the Loch of Forfar, which bears the name of St. Margaret, the Queen of King Malcolm Canmore, who died in 1097. It is chiefly natural, but has been strengthened by piles and stones, and the care taken to preserve this artificial barrier is attested by a record of the year 1508. Another crannoge—that of Lochindorb, in Moray—was visited by King Edward I. of England in 1303, about which time it was fortified by a castle of such mark that, in 1336, King Edward III. of England led an army to its relief through the mountain passes of Athol and Badenoch. A third crannoge—that of Loch Cannor or Kinord, in Aberdeenshire—appears in history in 1335, had King James IV. for its guest in 1506, and continued to be a place of strength until 1648, when the Estates of Parliament ordered its fortifications to be destroyed. It has an area of about an acre, and owes little or nothing to art beyond a rampart of stones and a row of piles. In the same lake there is another and much smaller crannoge, which is wholly artificial. Forty years after the dismantling of the crannoge of Loch Cannor, the crannoge of Loch-an-Eilan, in Strathspey, is spoken of as 'useful to the country in times of troubles or wars, for the people put in their goods and children here, and it is easily defended.' Canoes hollowed out of the trunks of oaks have been found, as well beside the Scotch as beside the Irish crannoges. Bronze (brass) vessels, apparently for kitchen purposes (**Fig. 179**), are also of frequent occurrence, but do not seem

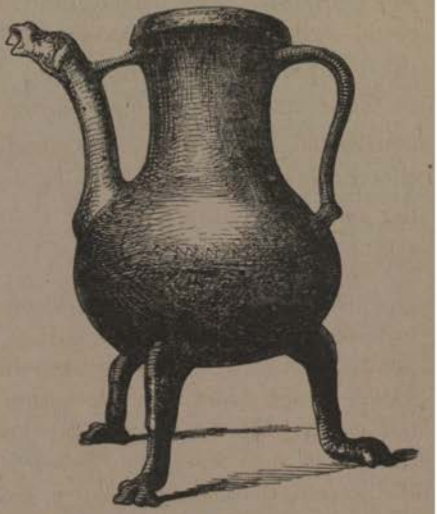

Fig. 179.—Brass Vessel found in Loch Canmor. Height, 10½ inches.

to be of a very ancient type. Deers' horns, boars' tusks, and the bones of domestic animals, have been discovered; and in one instance a stone-hammer, and in another what seem to be pieces for some such game as draughts or backgammon, have been dug up" (**Fig. 180**).

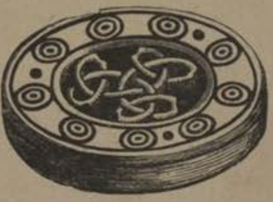

Fig. 180.—Bone Object found in the Loch of Forfar. Natural size.

"Before the recent drainage of the Loch of Leys—or the Loch of Banchory, as it was called of old—the loch covered about 140 acres, but, at some earlier date, had been four or five times as large. It had one small island, long known to be artificial, oval in shape, measuring nearly 200 feet in length by about 100 in breadth, elevated about 10 feet above the bottom of the loch, and distant about 100 yards from the nearest point of the mainland. What was discovered as to the structure of this islet will be best given in the words of the gentleman, of whose estate it is a part, Sir James Horn Burnett, of Crathes. 'Digging at the Loch of Leys renewed. Took out two oak trees laid along the bottom of the lake, one 5 feet in circumference and 9 feet long; the other shorter. It is plain that the foundation of the island has been of oak and birch trees laid alternately, and filled up with earth and stones. The bark was quite fresh on the trees. The

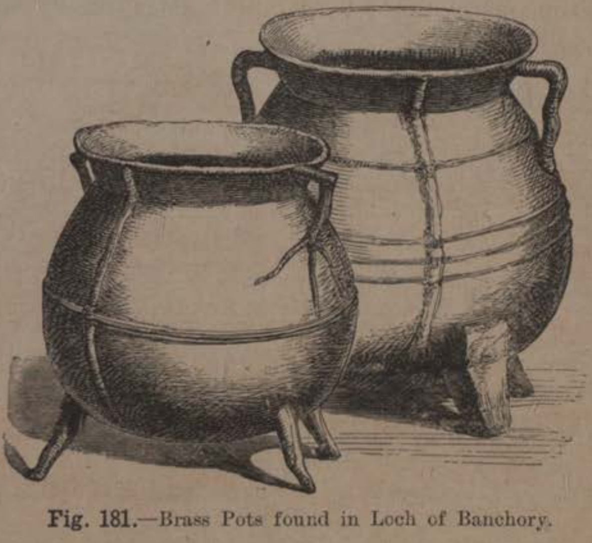

Fig. 181.—Brass Pots found in Loch of Banchory.

island is surrounded by oak piles which now project 2 or 3 feet above ground. They have evidently been driven in to protect the island from the action of water.' Below the surface were found the bones and antlers of a red deer of great size, kitchen vessels of bronze (brass) (**Figs. 181** and **182**), a millstone (taking the place of the quern in the Irish crannogs), a small canoe, and a rude, flat-bottomed boat about 9 feet long, made, as in Ireland and Switzerland, from one piece of oak. The surface of the crannog was occupied by a strong substantial building (**Fig. 183**). This

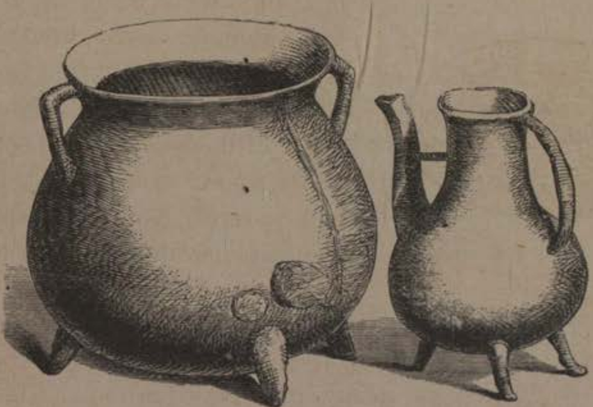

Fig. 182.—Brass Pot (height, 11 inches), and Brass Jug (height, 9 inches), found in the Loch of Banchory.

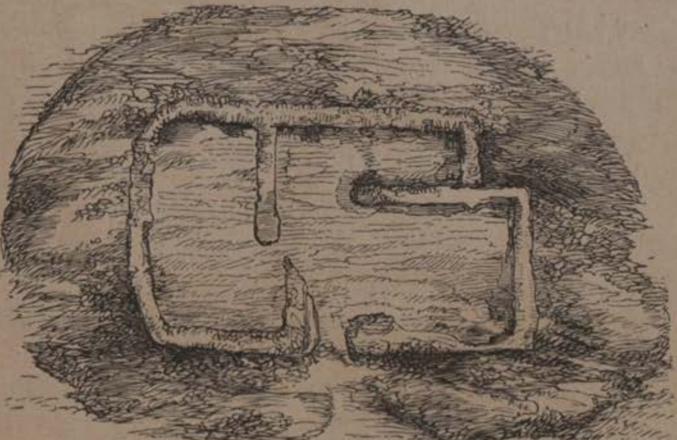

Fig. 183.—View of Surface of the Isle of the Loch of Banchory, showing foundations of Stone Buildings.

has latterly been known by the name of the Castle of Leys, and tradition, or conjecture, speaks of it as a fortalice, from which the Wauchopes were driven during the Bruces' wars, adding that it was the seat of the Burnetts until the middle of the sixteenth century, when they built the present castle of Crathes. A grant of King Robert I. to the ancestors of the Burnetts includes *lacum de Banchory cum insula ejusdem.* The island again appears in record in the years 1619 and 1654 and 1664, under the name of 'The Isle of the Loch of Banchory.'"

That Scottish lake-dwellings were known by the same name, *crannog,* as the Irish, Dr. Robertson adduces the following extract from the Register of the Privy Council to show:—

"Instructions to Andro bischop of the Yllis, Andro lord Steuart of Vchiltrie, and James lord of Bewlie, comptroller, etc. . . . That the haill houssis of defence, strongholdis and *cranokis* in the Yllis perteining to thame and their foirsaidis sal be delyverit to his Maiestie and sic as his Heynes sall appoint to ressave the same to be vsit at his Maiesty's pleasour, etc., 14 Aprilis, 1608."

While the comparative late occupancy of the crannogs in both countries is, therefore, unquestionable, their early origin is enveloped in the deepest mystery. Was the system an indigenous invention—the result of circumscribed local exigencies—or derived from foreign sources? and when was it founded or introduced? are questions that have elicited responses of different characters. Sir W. R. Wilde, undoubtedly one of the foremost authorities on Irish crannogs, assigns them to the Iron Age. "Certainly," says he, "the evidences derived from the antiquities found in ours, and which are chiefly of iron, refer them to a much later period than the Swiss; while we do not find any flint arrows or stone celts, and but very few bronze weapons, in our crannogs. Moreover, we have positive documentary evidence of the occupation of many of these fortresses in the time of Elizabeth, and some even later." (B. 24, p. 152.) Mr. G. H. Kinahan, on the other hand, thus formulates his opinion in a short article contributed to Keller's book (B. 119, 2nd ed., p. 654):—"Of the time when the crannogs were first built there is no known record, but that they must have been inhabited at an early period is evident, as antiquities belonging to the Stone Age are found in them. Some were in use up to modern times, Crannough Macknavin, county Galway, having been destroyed in A.D. 1610, by the English, while Bally-na-huish Castle was inhabited fifty years ago. Some crannogs seem to have been continuously occupied until they were finally abandoned, while others were deserted for longer or shorter periods. In Shore Island, Lough Rea, County Galway, there is a lacustrine accumulation over 3 feet thick, marking the time that elapsed between two occupations."

That objects supposed to be typical of the Stone and Bronze Ages have been found on many of the Irish crannogs there can be no doubt at all. For example, among the remains described by Mr. Shirley from the crannogs of MacMahon's country are stone celts, arrow-heads of flint and bronze, three looped celts of bronze, etc.; but these were associated with many iron objects of comparatively modern manufacture, such as a gun-barrel, pistol-lock, ploughshares of iron, parts of harps, and spinning-wheels, etc., etc.

"The oldest article," writes Mr. Benn, "from the crannog at Randalstown found, so far as I know, was a stone hatchet, rather of a small size, but not remarkable or uncommon. The most recent, and the only piece of coin I ever heard of, discovered in such a locality, is a base coin of Philip and Mary." (B. 29, p. 88.) In the crannog of Roughan Lake, the last retreat of Sir Phelim O'Neil, some bronze spear-heads were found, along with a highly ornamented quern stone. On the lowering of Lough Gur an island became visible which is said to have been a crannog, and on it were found, among other things, a remarkably fine bronze spear-head,* having its socket ornamented with gold, a stone mould for spear-heads (**Fig. 107**), and some bones of the reindeer; but yet it existed as a stronghold till 1599, when it was surrendered by the English to the Earl of Desmond.† The sword-blades figured by Wood-Martin (B. 444, pl. xxxvii.) as coming from crannog sites at Toome Bar are undoubtedly characteristic specimens of the Bronze Age weapons; but then the evidence that they are crannog relics at all is so slender that for determinative purposes they may be considered valueless. Moreover they were associated with objects equally typical of all ages—from palæolithic flints to mediæval silver ornaments. "All these flint flakes are of the earliest type," says Mr. Day, who describes this locality, "many closely resembling those found in the 'drift' at Abbeville;" and the relics include flint cores, stone and bronze objects, a "ring brooch, enamelled bead, and a silver armlet." (B. 92, p. 227.) Similar remarks are equally applicable to all the Scottish crannogs on which objects apparently belonging to different ages have been found. A reviewer of my work on "Ancient Scottish Lake-dwellings" (B. 373), in which I gave it as my opinion that the Lochlee crannog must be assigned to post-Roman times, takes exception to this opinion on the grounds that amongst the relics are a polished stone celt of neolithic type, flint scrapers, which, he says, "may be of the Bronze Age, but could hardly be considered as post-Roman," and portions of the antlers of the reindeer, which, according to him, "can hardly have ranged as far south at any period later than the neolithic age." Had my reviewer read the remarks in my book at page 147, regarding this polished greenstone hatchet, he would hardly have selected it to prove that this crannog existed during the neolithic age. My words are: "As many of the relics, if judged independently of the rest and their surroundings, might be taken as good representatives of the three so-called Ages of Stone, Bronze, and Iron, it is but natural for the reader to inquire if superposition has defined them by a corresponding relationship. On this point I offer no dubious opinion. The polished stone celt (that referred to by my reviewer) and an iron knife were found almost in juxtaposition about the level of the lowest fireplace." The iron implements on this crannog included hatchets, chisels, gouges, and a cross-cut saw, and the very lowest logs bore unmistakable evidence of having been manipulated with sharp metal tools. The entire absence of cutting instruments of bronze renders it more than probable that such tools were made of iron, and were similar to those found on the crannog. As for the conclusions educed from the presence of the horns of the reindeer (hesitatingly identified by the late Professor Rolleston), it is now actually proved that this animal was not extinct in Scotland before the twelfth century. In the "Orkneyinga Saga"* it is stated that "every summer the Earls were wont to go over to Caithness, and up into the forests, to hunt the red deer or the reindeer." The recent discovery of its bones and horns in refuse heaps in

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* Evans, "An. Br. Implements," p. 436.

† *Proc. R. I. A.*, vol. ix. p. 176; and vol. i., 2nd Ser., p. 223.

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* See translation of O. S., edited by Dr. Joseph Anderson, p. 182; also *Proc. S. A. Scot.*, vol. viii.

Caithness, and in many of the brochs in the north of Scotland, amply proves that the reindeer was hunted and eaten by the Norsemen as late as the above date.

Whatever explanation may be forthcoming as to the prevalence of prehistoric relics on these crannogs, there is no possibility of denying that the vast majority of them were not only inhabited, but constructed during the Iron Age. Mr. Wakeman, in the most carefully investigated of all the crannogs in Fermanagh, viz. that at Drumdarragh, describes three periods of occupation; yet among the relics corresponding to the earliest period were several iron objects, one being "an animal's head in iron," which he considers might be the leg of a pot. Nor am I aware that superposition has defined in any clear instance the heterogeneous mixture of relics that usually turn up on crannogs.

It must also be noticed that few, if any, of them can be classified as exclusively belonging to the earlier ages, like those so numerously recorded in Central Europe. Indeed, there are only two or three which have any claim to such delimitation, viz. those in Coal-bog (Kilnamaddo), in Drumkelin bog, county Donegal, and in Holderness. On the two former sites were found the most perfect examples of log-huts that have yet come to light, and as they were both deeply buried in peat, 17 and 25 feet respectively, they undoubtedly point to some antiquity. But the relics, which include a stone axe and some flint objects, are too few to justify such a sweeping conclusion as that these dwellings were constructed at a period when metal implements were unknown in the country. At any rate, there can be no reasonable doubt that the period of greatest development of the Scottish and Irish lake-dwellings was during the Iron Age, and, at least, as far posterior to Roman civilisation as that of the Swiss Pfahlbauten was anterior to it.

In instituting an inquiry as to how far the geographical distribution of crannogs coincides with that of the various nationalities of the period, we arrive at some striking results. Thus adopting Skene's division of the four kingdoms into which Scotland was ultimately divided by the contending nationalities of Picts, Scots, Angles, and Strathclyde Britons, after the final withdrawal of the Romans, I find that of the fifty or sixty crannogs proper none are located within the territories of the Angles; ten and seven are respectively within the confines of the Picts and Scots; while all the rest are situated in the Scottish portion of the ancient kingdom of Strathclyde. That they have not been found in the south-eastern provinces of Scotland may be due to the rarity of suitable lakes, or the want of proper research on the part of antiquaries; but, as the matter actually stands, their absence suggests the theory that these districts had been occupied by a foreign element before Celtic civilisation gave such a prominence to the lake-dwellings. It will be thus seen that in the early centuries of the Christian era the distribution of crannogs in Scotland and Ireland closely coincides with a well-defined area in which the Celtic language was spoken. For proof that in those days this was the language of the south-west of Scotland, I need only point to the recent work of Sir Herbert Maxwell on the topography of Galloway.

But from an etymological analysis of the earliest topographical nomenclature of Britain, it is inferred that, during still earlier times, a much larger portion of Britain, if not the whole of it, was under the sway of the Celts. Hence it becomes interesting to inquire if, in these localities, from which Celtic influence was expelled, there exist traces of lake-dwellings. In localities where the Celtic races were never supplanted by foreigners, it would be strange indeed, and altogether at variance with archæological experience, if the habit of resorting to isolated and inaccessible islands for safety would be all at once abandoned, whenever the greater security afforded by stone buildings became known. Hence the persistence with which the island forts continued in these Celtic regions. But in this wider Celtic area, on the supposition that the Celts were the introducers or founders of the system, we ought to find some vestiges of these dwellings along the regions traversed by them before they became isolated from their Continental brethren, and cooped up in the western districts of Britain. This is precisely what the general researches into British lake-dwellings have shown in the stray remnants of them that have been found in Llangorse, Holderness, the *meres* of Norfolk and Suffolk, Cold Ash Common, etc. All these, with perhaps the exception of the pile-structures at London Wall, appear to be older than the majority of the crannogs of Scotland and Ireland.

Taking all these facts into account, together with the distinct statement made by Cæsar that the Britons were in the habit of making use of wooden piles and marshes in their mode of entrenchments, I am inclined to believe that we have here evidence of a widely distributed custom which underlies the subsequent great development which the lake-dwellings assumed in Scotland and Ireland. Moreover, I believe it probable that the early Celts had got this knowledge from contact with the inhabitants of the pile-villages in Central Europe. On this hypothesis it would follow that the Celts had migrated into Britain when these lacustrine abodes were in full vogue in Switzerland, and that they retained their knowledge of the art long after it had fallen into desuetude in Europe. Subsequent immigrants into Britain, such as the Belgæ, Angles, etc., would cultivate new and improved methods of defensive warfare; whilst the first Celtic invaders, still retaining their primary ideas of civilisation, when harassed by enemies and obliged to act on the defensive would have recourse to their inherited system of protection, with such variations and improvements as better implements and the topographical requirements of the country suggested to them. It is as defenders, not as conquerors, that the Celts constructed their lake-dwellings.

This hypothesis, which was first enunciated in my work on "Ancient Scottish Lake-dwellings" as a mere conjecture, has elicited a considerable diversity of opinion on the part of critics. In the *Times* of October 4th, 1882, it is thus referred to :—"This is pure theory, and is quite unnecessary to account for the facts: as well might one argue a connection between the pile-dwellers of New Guinea and Central Africa and those of the Swiss lakes." Sir John Lubbock (*Nature*, December 24th, 1882) confesses that he is disposed to doubt that there is any connection between the geographical distribution of the Scottish lake-dwellings at present known and that of the ancient Celts. On the other hand, another reviewer attempts to defend it on the ground that "in the Swiss lake-dwellings of the Iron Age there are indications, especially in the ornamentation of the sword-sheaths and other articles, of a style of art which closely corresponds to the style of decoration prevalent in the crannogs of Scotland and Ireland (*Scotsman*, November 22nd, 1882).

The indications above alluded to in support of this hypothesis as based on a comparison of the relics, will be more appropriately discussed in my next lecture, when I come to review the lake-dwellings of the Iron Age in Central Europe. There are, however, one or two objections urged on the other side—as, for example, the difference of structure and late occupancy of the crannogs, as compared with the Swiss lake-dwellings—that require now to be shortly considered.

As to the supposed difference in structure, I need only refer to the structural details of various fascine-dwellings, as in the lakes of Fuschl, Schussenried, Niederwyl, Inkwyl, Wauwyl, etc., as a sufficient proof of the resemblance between them and the Scottish and Irish crannogs. It is true that the pile-dwellings were more numerous on the Continent than the fascine structures, while the reverse is the case in Scotland and Ireland—if indeed the former can be said to have existed at all in these countries. That the pile system was, however, known to the crannog-builders, and occasionally acted upon, we are not devoid of some positive evidence. Mr. G. H. Kinahan says that a few of the Irish crannogs were built on piles (B. 119, 2nd ed. p. 654), and instances an example in Loch Cimbe (now Loch Hackett), county Galway, which was so frequently blown down that the occupiers were obliged to convert it into an island, which they did by adding boat-loads of stones to its site. One of the lake-dwellings in Lough Mourne I concluded to have been a pile-dwelling (see page 386), and it was connected to the shore by a wooden gangway. Mr. Burns Begg describes remains of a pile-dwelling in Loch Leven as an "oblong wooden platform, raised above the water on piles, twelve feet or upwards in height." (B. 460.)

Subsequently I had an opportunity of visiting the locality, along with Mr. Burns Begg, and I am convinced these remains could not have been an ordinary submerged crannog or artificial island. The lake bottom is not soft and compressible, but, on the contrary, very compact and quite incapable of yielding to any great extent. The structures, even in the present reduced level of the loch, are never less than 1 or 2 feet below the surface; but as formerly there would have been 9 feet more of water over them it is quite improbable that this amount of submergence could be accounted for by the usual subsidence or compression of the submerged materials.

Some of the examples of lake-dwellings recorded in England, such as those described by Sir Charles Bunbury and Dr. Palmer, would appear also to have been pile-structures.

If, therefore, both principles were known among the crannog-builders of the British Isles, why, it may be asked, did they give a preference to the fascine structures? I have already remarked that these structures on the Continent were confined to small mossy lakes, which, owing to the yielding nature of their sediments and peaty deposits, were unsuitable for pile-dwellings. In such conditions, which are generally prevalent in Scotland and Ireland, the wooden island supplied more readily, and perhaps with less labour, the requisite stability for platforms in boggy lakes and marshes intended for huts and other superstructures, especially when these platforms were small and the islands sparsely placed.

The wide chronological interval which separates the crannogs from the lake-dwellings of Central Europe is also supposed to militate against the supposition of there being any causal connection between them. But this gap is more apparent than real, as, when carefully looked into, it will be found to have been bridged over by a closer series of links than was hitherto imagined. Not only were there some lake-dwellings in Switzerland during the Iron Age, but in several instances Roman, Gallo-Roman and even Allemanish remains were found on their sites, as in the lakes of Starnberg, Ueberlingen, Zürich, etc. (See page 543.) Among the antiquities collected on the site of the dwellings in Lake Paladru were horse-shoes, curry combs, and a variety of other antiquities which, in the opinion of M. G. de Mortillet and other archæologists, could not be accounted for as the products of any civilisation prior to Carlovingian times. We have also seen that in North Germany they existed at equally late times, having overlapped considerably into the Slavish period; while the Terp-mounds in Holland and other places were only superseded by the construction of the great sea-dykes. It must also be remembered that the custom of constructing lake-dwellings was not universally adopted in Europe. Their absence in Northern Europe, Spain and Portugal, and other places cannot be accounted for by a deficiency in the topographical and hydrographical requirements for such structures. They appear to have spread from the great central area of their first development in Europe in sporadic fringes, but never extending beyond the limits to which the ordinary waves of human intercourse and civilisation would likely reach.

Taking all these circumstances into consideration, I repeat that, while we are justified in ascribing the remains of lake-dwellings, so far as they are at present known within the British Isles, to a Celtic source, I see no *prima facie* improbability, as regards their structure and distribution in space and time, against the hypothesis that the Celts derived their knowledge of this custom from the great system of Central Europe, though founded and developed at a much earlier period.

The only exception to the general statement that the Celts were the sole constructors of lake-dwellings in Britain (without taking into account the earlier vestiges of such structures in England from which, owing to the scarcity of industrial remains, there is, as yet, no ethnological evidence either way), is the discovery at London Wall recorded by General Pitt-Rivers. I have already remarked (page 464), on the similarity of these remains to those from the Terp-mounds in Friesland. Especially interesting are the two bone skates, made from the metacarpals of the horse, recorded from the former, because such implements are common in the latter. I do not agree with Lindenschmit (page 462) in assigning all these so-called skates to the Stone period. On the contrary, they are mostly of post-Roman date. In lake-dwellings they are very rarely met with, and only one is recorded as coming from a station of the Stone Age, viz. Moosseedorf (page 75). The other localities from which examples have been recorded are Persanzig (page 315), Dabersee (page 317), Kownatken (page 328), Starnberg (B. 119, 2nd ed., p. 593), and a Terramara in Hungary (page 167).

Though the Anglo-Saxons, in coming from the mouth of the Elbe and the low-lying districts between it and the Rhine, must have been familiar with marine pile-structures, they do not appear to have cultivated the system to any great extent after immigrating into Britain. But this may be accounted for by the fact that very soon they became the conquerors of the country. It is only for defence that lake and marsh-dwellings have been resorted to.

Sixth Lecture.

THE LAKE-DWELLERS OF EUROPE—THEIR CULTURE AND CIVILISATION.

I.—STONE AGE.

In the summary of the remains of lake-dwellings which I have brought under your notice in the previous lectures, you will have observed that there was often a great diversity in the character of the relics even in stations that were lying close to each other. From the study of this feature alone we must conclude that some flourished at a time when the use of metals was entirely unknown to their inhabitants, as all tools and weapons recovered from the *débris* were made of such materials as stone, bone, horn, etc. The substitution of bronze for these materials marks a decided change in the culture and civilisation of the lake-dwellers—a change which becomes further modified by the introduction of iron. We have thus a great variety of lake-dwellings, distinguishable from each other generally by the character of their industrial remains, according to the particular civilisation which prevailed at the period of their habitation, some dating from the pure Stone Age, others from the Bronze Age, while others again bear the imprint of various later civilisations, as Roman, Celtic, Carlovingian, Slavish, etc. In dealing, therefore, with lacustrine remains as a whole, we have to take into account not only their distribution over a wide geographical area, but also their continuance in various parts of Europe for a long period extending from the Neolithic Age to the dawn of written history.

The outlying parts of this wide field, comprising more particularly the lake-dwelling remains in North Germany and in Great Britain and Ireland, I have already sufficiently dealt with when treating of their archæological details, so that it is unnecessary to bring them again prominently forward. There remains, therefore, only the central area of Europe, where they originally developed and so extensively flourished during the Stone and Bronze Ages. To draw, from a general criticism of the mass of recovered materials which I brought before you in the first three lectures, some general notion of the culture and civilisation which characterised their occupiers is therefore the first and primary object of this lecture.

Though the famous three ages of Stone, Bronze, and Iron had been established as a method of classification before lacustrine treasures became known, I question if there is in the whole range of prehistoric archæology any class of antiquities that gives greater support to this remarkable chronological sequence, or throws more light on the introduction of metals into Europe than those collected from the lake-dwellings. The period of duration of the early pile-dwellings in Central Europe entirely covers and overlaps that which witnessed the introduction of the great art of metallurgy in Europe. While the contents of graves and ceremonial burials are important in preserving special products of the technical skill of a people, we have from some of these lacustrine dwellings materials for reconstructing the entire life history of their inhabitants, giving, as it were, a complete picture of their arts, industries, luxuries, and amusements.

That many of these lake-villages, built as they were on wooden platforms and constructed of combustible materials, were liable to conflagrations, we can readily believe, and we have had conclusive evidence that many of them came to an untimely end in this manner. It is, indeed, to such catastrophes that we owe much of our information, as the sudden interruption of busy life-scenes in such a manner and especially when accompanied by circumstances that tended to preserve the ruins from decay, has been the means of supplying us, as it were, with a photographic picture of the habits, customs, and industries of the people; and it requires only a sufficient number of such instances to be able, from a comparative examination of the recovered relics, to construct a fair scale of the progressive civilisation and culture of the lake-dwellers. On the other hand, there are lacustrine villages which have existed, through various ages, such as Nidau, but the association of objects so widely separated in point of time in one place becomes misleading, especially if their relative ages cannot be tested by superposition in the relic-bed—which can rarely be the case in lacustrine investigations, as in the act of dredging the relics are all jumbled together.

Professor Desor, observing that large quantities of pottery of every description were found in certain localities, which could not belong to one family, and that many of the bronze weapons and implements were new and unused, suggested that the palafittes in Lake Neuchâtel were merely magazines or shops, and not the ordinary residences of the people. (B. 252, p. 3.) But this opinion has not been adopted by Swiss archæologists; nor indeed is it at all justified from a study of the character of the multifarious objects discovered among their *débris*, which undoubtedly point to village life and the exercise of social and domestic avocations on the spot. Dr. Gross, in combating Desor's opinion, so far as founded on the unused condition of many of the relics, remarks:—"Je possède dans ma seule collection les tronçons de plus de dix épées réduites à l'état fragmentaire par un long usage. Un grand nombre d'outils s'y montrent altérés et modifiés par la même cause." (B. 392, p. xii.)

The settlements of the pure Stone Age are found only in a limited area in Central Europe. Their greatest development has been in the lakes bordering on both sides of the Alps, and it is especially from the data there supplied that we become acquainted with their characteristic features. This area may be more specifically defined as including the lakes of Lombardy, Laibach, Bavaria, Switzerland, and Savoy, with the exception perhaps of Lake Bourget—whose palafittes appear to have been constructed exclusively in the Bronze Age.

One of the most striking facts, and one to which I invite special attention, is the advanced state of the culture and social organisations which prevailed amongst the earliest constructors of these singular abodes. It is beyond doubt that, from the very start, their inhabitants were acquainted with various industries, especially weaving, which they sedulously practised; that they reared the ordinary domesticated animals; and that they cultivated flax, fruits, and various kinds of grain. For example, at Wangen two varieties of wheat and the two-rowed barley were distinctly recognised both in whole ears and in the separate grain, the latter in quantities that could be measured in bushels. The stones of the grape, which Professor Heer (B. 123) somewhat hesitatingly announced among the fruits from this station, may now be accepted as genuine, as the grape (*Vitis vinifera*) has recently been found at Steckborn, another station of the pure Stone Age,* and at Haltnau. (B. 462, p. 58.) Several varieties of well-made cloth of flax, and mats of bast, were also found at Wangen. There is preserved in the Museum of Fribourg a carbonised spindle from Lake Morat, which shows fine threads still coiled round it, and Dr. Gross figures a similar object from Locras. (B. 392.) Most antiquaries are acquainted with the remarkable varieties of cloth, fringes, nets, cords, and ropes brought to light by Messikommer from the very lowest relic-bed at Robenhausen (**Fig. 25**). Even specimens of embroidery were found at the adjoining station of Irgenhausen. (B. 126, Pl. xvi.) Remains of linen cloth, thread, nets, basket-work, etc., have also been found in a great many other stations, as Vinelz, Locras, Schaffis, Lagozza, Laibach, etc. But the absence of such fragile and perishable relics from many other stations is not to be taken as evidence that their inhabitants were unacquainted with such industries; for it must be remembered that it is only when fabrics are carbonised, or deposited in circumstances exceptionally favourable to their preservation, that they are prevented from undergoing the natural process of decay. Thus, at Schussenried, though there was no actual cloth found, the impression of a well-woven fabric is clearly seen on a consolidated mass of wheat—probably that of the sack in which the grain had been stored—and at Laibach a similar impression was observed on a fragment of pottery.

One of the stations in Moosseedorfsee which became completely exposed in consequence of drainage operations, and was carefully examined by the experienced archæologists Messrs. Jahn, Morlot, and Uhlmann, yielded a large assortment of the osseous remains of animals, amongst which the following were supposed to have been in a state of domestication, viz.:—dog, sheep, goat, pig, and various kinds of oxen. A few bones and teeth of the horse were also found, but these might have belonged to the wild species, as it is not agreed, nor is there any evidence, that this animal was domesticated till the Bronze Age. The cultivated plants from this station were barley, two kinds of wheat, pea, poppy, and flax. Among an assortment of its industrial remains, now in the Bern Museum, are about a dozen celts of nephrite (one of jadeite), bits of cord, a wooden comb, a fish-hook made of a boar's tusk, flint saws in their wooden handles, and fragments of pottery, some of which are ornamented with nail-marks or perforations round the rim. One piece of dark pottery (**Fig. 184,** No. 5) has a series of triangular bits of birch bark stuck on its surface by means of asphalt. (B. 336, p. 37.) If any further evidence were required to show the skill of the early lake-dwellers in the arts of spinning and weaving, and the extent to which they followed agricultural pursuits and the rearing of domestic animals, I have only to call attention to the vast number of spindle-whorls, loom-weights, etc., which are everywhere to be met with; the corn-crushers, yokes for cattle (**Fig. 184,** No. 1), field hoes, picks, and other agricultural implements found on the sites of the earliest settlements, as Robenhausen, Schaffis, Schussenried, etc.

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* *Antiqua*, 1883, p. 15.

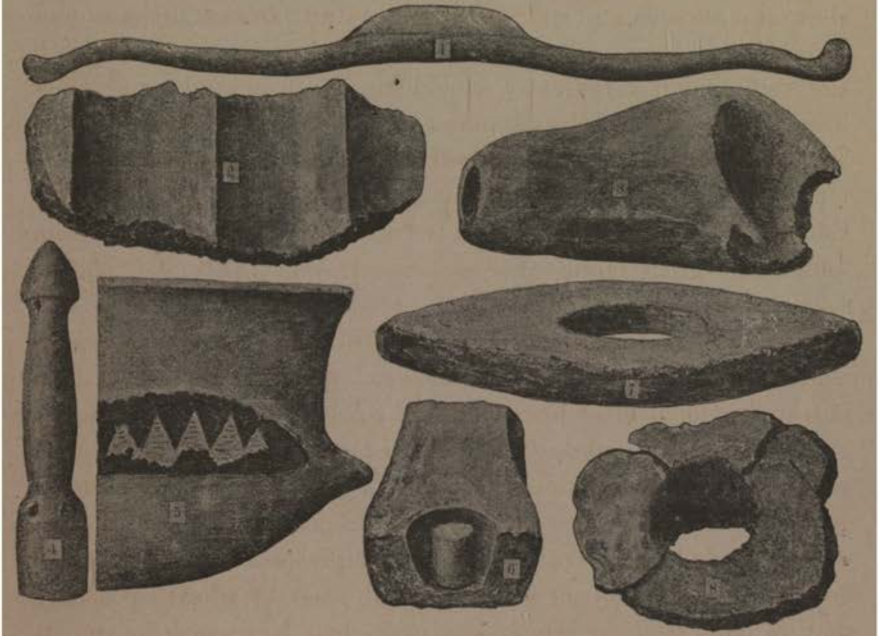

Fig. 184.—MISCELLANEOUS OBJECTS. No. 1 = about $\frac{1}{14}$, 4 = $4\frac{1}{3}$ feet long, 3 and 8 = $\frac{1}{4}$, and the rest = $\frac{1}{2}$ real size.

That the potter's art was well known to, and practised by, the early lake-dwellers hardly needs any demonstration when we look at the mass of fragments, and even whole dishes, consisting of bowls, plates, cups, jugs, spoons, and large vases, now tabulated and stored in the various museums of lacustrine objects. These dishes were made without a knowledge of the potter's wheel, and the paste generally contained coarse sand or small pebbles; but a finer kind was also used for the smaller vessels. Generally speaking they are coarsely made in the earlier stations, having perforated knobs instead of handles, yet occasional examples turn up which show that handles were not unknown. The ornamentation consists of finger and string marks, irregular scratchings with a pointed tool, raised knobs, perforations round the rim, together with dots and lines in various fantastic combinations. No two vessels exactly alike in style and ornamentation have ever been found. The only approach that I have seen is in the case of two vases, one from Bodmann (**Fig. 30,** No. 20), and the other from Schussenried (**Fig. 35,** No. 4), which certainly suggest that the vessels were made under the influence of the same artist. In Lagozza and Polada artistic patterns were made from the impressions of a small tube, probably a stiff straw or a bone instrument, alternating with panels of crossed lines. In Laibach great skill is exhibited, not only in the variety and elegance of the vessels, but also in their ornamentation, which consists of various figures, rectangles, crosses, rhombs, triangles, etc., the lines of which are flanked with small pointed impressions. In the Mondsee a similar taste for geometrical figures is displayed, and here the lines are large and deeply cut so as to admit of the insertion into them of a white substance which, on the originally black pottery, must have had a striking effect. Associated, however, with these fantastically ornamented dishes, both in Laibach and the Mondsee, are others of a much inferior type.

To the food supply derived from agriculture, the rearing of domestic animals, and the seeds and fruits of wild plants, they added the produce of hunting and fishing; and the remains of the weapons used in these pursuits are numerous. Arrow-points of flint and sometimes of other minerals, as rock crystal and jade, and of bone, are amongst the most common relics; and even a few of the bows made of yew wood, notwithstanding their liability to decay, have come to light, two from Robenhausen, and one from each of the stations of Vinelz, Sutz, and Clairvaux.

It appears that the earlier arrow-points were of the triangular type, with or without stems, and it is supposed that the addition of barbs was an evolutionary process of improvement, and of course of later date. Thus none of the arrows from Schaffis have barbs, but on the other hand Vinelz has supplied some beautiful examples (**Fig. 7**). The barbed forms are also prevalent on the palafittes of Lake Varese and Polada, but they are entirely absent from the stations in the Mondsee, Attersee, and Laibach Moor.

The discovery of some arrow-points with a portion of the wooden shaft still attached has disclosed the fact that this union was accomplished, at least in some instances, by means of an adhesive material like asphalt. In the Neuchâtel district this material might, indeed, be the natural product of this name, as it is so readily found in the neighbouring *Val de Travers.* It is more probable, however, that, as suggested by Dr. Dom, of Tübingen, it was the manufactured product of birch-bark—a suggestion which explains the frequency with which rolls of this material were found among the *débris* of so many lake-dwellings. This adhesive material was used, not only for fixing arrow-points and other implements in their handles, but also, when mixed with charcoal, to give a black gloss or varnish to pottery. Its discovery and application for such purposes in Polada, Mondsee, Schussenried, and many of the Swiss stations of the Stone Age, as St. Aubin, Locras, Moosseedorf, etc., proves that its use was prevalent over the whole lake-dwelling area of the Stone Age.

Spear-heads and daggers were manufactured from flint, and specimens of the latter have been found inserted into a wooden handle or surrounded by a withe so as to give a better grip to the weapon. There were also very effective weapons of this class made from the leg-bones of deer and other animals, as well as from the tines of staghorns, etc.

For the purpose of carrying on the ordinary avocations of domestic and social life the lake-dwellers were in possession of a varied assortment of tools and implements, the precise function of some of them, however, being difficult to determine. They had hatchets, knives, saws, scrapers, borers, etc., of flint and other hard stones. Cutting instruments were also made of horn, bone, and the tusks of the wild boar, as well as an endless variety of pointers, chisels, etc. With such tools they constructed wooden houses, scooped out canoes, and shaped wood into various kinds of dishes, clubs, and handles. The stone celt or axe-head, the most indispensable of all implements to the Stone Age people, was mounted in a variety of ways. Most frequently there was a casing of horn into which the axe was fixed, and this casing was then fitted into a wooden handle (**Fig. 185,** Nos. 8 and 10). Sometimes the horn fixing had a V-shaped slit in the opposite end from the hatchet (**Fig. 7,** No. 13), which fitted into a corresponding slit in a crooked handle (**Fig. 185,** Nos. 1, 13, and 14). When locked the instrument became a kind of adze, the cutting edge transverse to the axis of the handle. This method Dr. Gross thinks was more especially used in the Copper Age. At Wangen horn fixings were rarely used, the hatchet being inserted into a split cleft in a crooked branch. It is interesting to note that this method was in use among the prehistoric salt-miners at Hallein, near Salzburg,* and at Castione in Italy (**Fig. 185,** No. 13).† The smaller axes and chisels, as well as a variety of flint implements, were not infrequently inserted directly into suitable portions of deer-horn, as shown in many of the accompanying illustrations.

The perforated axe of stone or horn had simply a wooden handle firmly fixed by a wedge inserted into a split at its end in the perforation, an example of which, found at Schussenried, Mr. Frank carefully preserves. Besides these there is a variety of objects of horn and bone which might have been used as implements or weapons, but mostly, I should say, for agricultural purposes, such as picks (**Fig. 185,** Nos. 4 and 7), hammers, clubs, etc. Some of the smaller bone implements were also inserted into handles, specimens of which were particularly numerous at St. Aubin.

Flint saws were extremely abundant, and are to be found among the remains of almost all the earlier stations, many of which still retain their wooden or horn handles. Only in Polada has the compound and double-handed saw been found (**Fig. 67,** No. 12). It consists of a casing of wood with four flints cemented into a groove along one of the edges.‡

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* *Matériaux, etc.*, vol. xvi. p. 215.

† *Bullettino Palet. It.*, An. i. p. 7.

‡ While visiting Mr. Flinders Petrie's collection of antiquities from Egypt lately exhibited in London, I was much interested in seeing a well-shaped wooden sickle with a groove in which a flint saw was still cemented in its place. The groove is adapted for three such saws, but only one remained in its place. The wooden portion of this unique instrument is shaped like a modern corn-hook, with the exception that the handle turns downwards at a right angle to the cutting plane, and the opposite end runs out into a long sharp point. It measures 12½ inches from tip to tip, and 17 from the point to the most bulging part of the body. From the same place were various other flint implements and some semilunar knives or saws, precisely similar

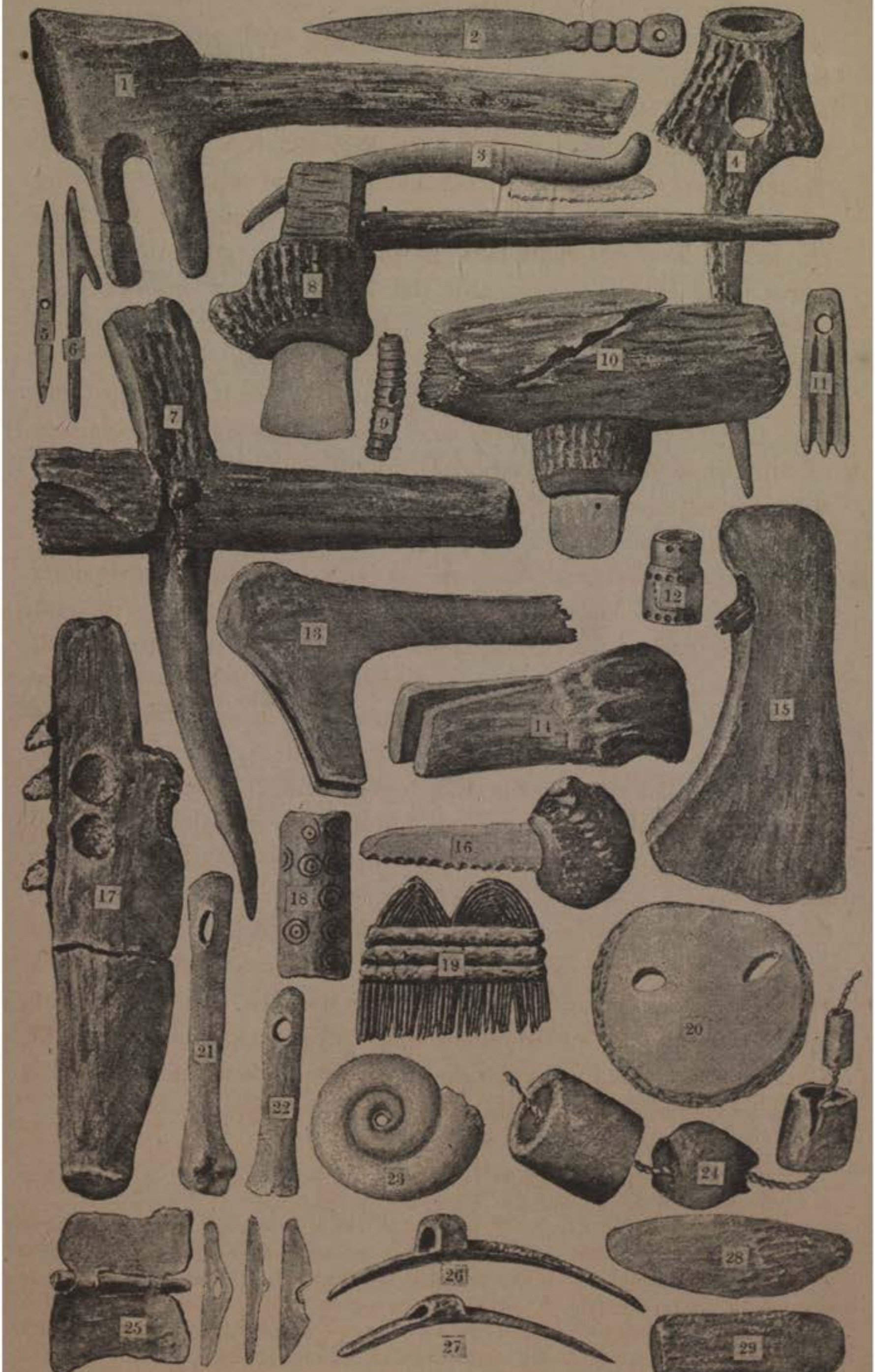
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Fig. 185.—MISCELLANEOUS OBJECTS. Nos. 20 to 24 = $\frac{2}{3}$, and the rest, except No. 25 = $\frac{1}{3}$ real size.

Another curious implement supposed to be a saw was found at Vinelz, and is now in the Cantonal Museum at Berne (**Fig. 185,** No. 17). It consists of a massive handle of wood, evidently fashioned for the hand, with three worked flints stuck in a row and kept in their place by asphalt.

Among domestic utensils, in addition to pottery, are small cups and boxes made of horn (Nos. 12 and 18). There are also spoons, pins, needles, buttons, awls, knives, flax-combs, etc., of bone. Combs for the hair were generally made of wood in the usual form (**Fig. 11,** No. 7). Another most ingenious method was by binding together a series of prepared twigs with their ends folded one way, as seen in **Fig. 185,** No. 19.

Wooden dishes cut out of the solid, such as ladles, bowls, tubs, etc., have been found in many stations, but especially at Robenhausen; and there can be no doubt that similar vessels were in general use among the early lake-dwellers.

I have already noticed the finding of fishing-nets at Robenhausen and Vinelz, and a fish-hook ingeniously made from a boar's tusk. Other fish-hooks were made of bone, as seen in the illustrations from Bodmann, Wangen, and Bauschanze.

Nor were these early settlers insensible to the charms of personal ornament. Shells (both recent and fossilised), coloured pebbles, the teeth of carnivorous animals, ornamented pieces of bone and horn, stone and clay beads, and even roundlets of the human skull, were pierced for suspension, and worn either as pendants or necklaces (Nos. 9, 11, and 20 to 24).

The skill displayed in the manufacture of the perforated stone axes and hammers has often excited the astonishment of antiquaries; and many of them thought that it was hardly possible to bore perfectly round or oval holes through such hard materials without the use of metal tools. Yet this was undoubtedly done, as we find not only bored implements, but smoothly sawn portions, in the very earliest stations, as, for example, Schaffis, Moosseedorf, Wangen, Robenhausen, etc. From the former there are in the Berne Museum stone celts with a round hole and one with an oval-shaped perforation. Quite as inexplicable are the

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to those so common in the Scandinavian archæological area. Mr. Petrie also pointed out some flint objects which were undoubtedly an imitation of implements of copper and bronze with which they were associated. The tombs of Hawara in which these relics were discovered are said to be of the 12th dynasty, dating some 2,600 years B.C.

numerous fragments of stone, clearly indicating, from the parallel grooving, that they were sawn off. Some of these pieces are by no means small, and such as could be readily accounted for by the use of flint saws. In the Museum of Zürich there is a large water-rolled stone of serpentine, measuring 14 by 9 by 8 inches, which was dredged up at Wollishofen, showing a cut 11 inches long and $\frac{5}{8}$ inch deep. One side of the cut was broken off, but the fragment was fortunately also recovered and when made to fit in its place, which it does to a nicety, the maximum breadth of the cut can be readily ascertained to be $\frac{3}{8}$ of an inch. The sides of this cut are finely striated with parallel grooves, which are not exactly straight, but bent slightly downwards in the middle. Before the sawing was begun there are clear indications of a superficial groove having been made by chipping, evidently with the intention of guiding the saw in the initiatory stages of the process. What could this saw have been made of? I do not think that with a flint implement this cut could have been made. It is as regular as that from a modern steel instrument. It is now supposed that the sawing of stones was performed with a thin wooden board and some dry sand. The late Dr. Keller experimented with these simple means, and found that they were quite sufficient for the purpose. He also practically proved that in the same way, with a wooden tube set in rapid motion round its axis, he could easily bore a hole in the hardest stone. (B. 336, p. 49.) Anyone visiting the Museum in Zürich may practically test the efficacy of these processes for himself, and the obliging custodian delights in showing the method of working. Soft wood is found to be better than hard, as the former takes up more of the particles of the sand, which act like fine teeth in grinding the stone. That tubes of some kind were used for boring stones by the lake-dwellers is demonstrated by the finding of hundreds of round cores, the result of boring on this principle, as well as, sometimes, implements with the boring begun but incompleted, showing the round core still in the hole as shown in **Fig. 184**, No. 6. In the Zürich Museum there is also a stag-horn hammer from Robenhausen with a partially bored hole having a core in its centre, thus proving that horns were also manipulated in the same way (**Fig. 24**, No. 12).

No problem has for many years puzzled archæologists more than the effort to account for the finding, from time to time in various parts of Europe, of those remarkably elegant implements made from the mineral substance commonly known as jade. Hitherto they have been generally found isolated in the soil or in graves of the Stone Age, such as the dolmens of Brittany. The favourite theory, seeing that no local habitat could be assigned to this mineral, was that these implements were imported by the original neolithic people, who were supposed to have migrated westwards from the plains of Northern India. The discovery of a large number of celts and small chisels in the lake-dwellings, together with a few other objects made of nephrite, jadeite, and chloromelanite, has reopened the problem as to their origin, with the result, however, of making the controversial flame burn brisker than ever. Independent of the lake-dwelling finds, the number of jade objects now known in Europe may be roughly stated at 200, about the half of which come from some 44 departments of France. Of the remaining 100 about 80 are from Western Germany, the rest being assigned to various localities in Italy,[*] Austria, and Greece. According to the opinions of competent mineralogists the vast majority of those from Western Europe are made of jadeite and chloromelanite, the number made of the former being slightly in excess of the latter. In the French group there is only one of nephrite, from the vicinity of Rheims, and in the German group three or four, found in Baden and Bavaria. Mr. A. B. Meyer states that, with the exception of one from Posen, all the German examples were found to the west of the Elbe.

In appearance, nephrite, jadeite, and chloromelanite closely resemble each other, and, owing to considerable variations in the colour to which they are all more or less liable, it is difficult to distinguish them by the unaided eye. Generally speaking nephrite has a somewhat soapy feel, with a lighter and more transparent tint of green than jadeite, while chloromelanite is darker and less transparent than either. According to Meyer their specific gravity is:—nephrite 2·9 to 3·2, jadeite 3·3, and chloromelanite 3·4 to 3·6. From the large number of implements, especially hatchets, small chisels, and sometimes knives (**Fig. 185**, No. 28)—rarely arrow-points and ornaments—found in almost all the lake-dwelling stations of the Stone Age, it would appear that they were greatly admired and much sought after by the inhabitants of these settlements. Dr. Gross thinks they were in greatest abundance in those stations which flourished in the period immediately preceding that of the introduction of metals, and that after this event they disappear altogether. (B. 392, p. 10.)

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[*] B. 423, pp. 80, 90; *Bul. Palet. Ital.*, An. xii. p. 80.

From Lake Constance the number of jade implements now considerably exceeds 1,000, as may be verified by an inspection of the museums in the neighbourhood. One station alone, Maurach, has supplied 349 tolerably well, and 141 badly, made implements, and no less than 154 chips and sawn portions varying from the size of a finger-nail to a few inches. (B. 378, p. 78.) Similar chips have also been occasionally met with in other stations. This at once settles one important point, viz. that the lake-dwellers were in actual possession of the raw material, which they worked on the spot. Although most of the settlements in Lake Constance have yielded more or less specimens, there is none that even approaches Maurach in point of numbers, the next highest being Unter-Uhldingen, Immenstadt, and Sipplingen, from each of which two or three score have been collected. In moving eastwards towards the Danubian valley they become much rarer. Thus Schussenried has yielded only one (jadeite), Olzenreuthe seven (all nephrite), Starnbergersee two (nephrite), Laibach one (nephrite). Only one (jadeite) is recorded from the Mondsee, and none from the Attersee. According to Fischer * 97 per cent. of the implements from Lake Constance are of nephrite, while the other three per cent. are nearly equally divided between jadeite and chloromelanite. In the Zürich Museum he found 28 implements of nephrite, one of jadeite, and six of chloromelanite. Of the former, 22 are from Meilen and four from Robenhausen. Out of 295 in the museums of Berne (which came from the lakes of Neuchâtel, Bienne, Morat, Inkwyl, and Moosseedorfsee), 118 are of nephrite, 124 of jadeite, and 53 of chloromelanite. From these approximate calculations we see that while nephrite was greatly in excess of jadeite in the settlements of Lake Constance and its neighbourhood, this inequality becomes gradually removed as we move westwards, till we come to France, where their relative frequency becomes actually reversed. Chloromelanite, on the other hand, though as a whole much rarer than either nephrite or jadeite, seems to have been more evenly distributed. Roundly speaking, we have in all Europe between 300

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* *Archiv für Anthropologie*, vol. xvi.

and 400 worked objects of jadeite, and about 200 of chloromelanite, while those of nephrite amount to twice these numbers combined.

These facts are very suggestive, and undoubtedly give some support to the theory that these minerals were found by the lake-dwellers somewhere in their own neighbourhood. But notwithstanding the most careful searching on the part of geologists and mineralogists not a particle of any of them has yet been found *in situ* in any part of Switzerland. As an inducement to country people to be on the look-out a reward of 200 francs was offered a few years ago [*] to anyone who could produce a bit of nephrite, found *in situ*, of the size of a man's fist, but as far as I know, the reward still lies unclaimed.

Three isolated portions have been found in Germany, one in the alluvial sands of Potsdam, another in the vicinity of Meersburg, and a third in the vicinity of Leipzig.[†] Also in somewhat similar circumstances two portions have been recorded from Styria.[‡] It is said to have been found *in situ* in small quantities in the rocks of Silesia, as recorded by H. Traube, of Breslau, in an article entitled "Über den Nephrit von Jordansmühl in Schlesien." [§] Mr. Roediger directs attention (by a note in *Antiqua*, 1884, p. 150) to the fact that it was stated to have been found in the Canton Freiburg, in a work published in 1834. A few chips were found in the prehistoric caves at Mentone associated with worked flints. [||]

To these remarks on the jade question I have only to add that Dr. Arzruni[¶] maintains that the nephrite and jadeite of the lake-dwellings can be microscopically shown to differ from the Asiatic mineral. It may also be interesting to note that 13 small axes or chisels of jade were found by Schliemann in the prehistoric cities of Troy (*Ilios*, p. 240).

As to the huts or cottages in which the lake-dwellers lived the evidence is still somewhat scanty. For a long time the only indications that huts were erected over the platforms consisted of portions of clay having the impressions of round timber (**Fig. 184**, No. 2), hearth-stones, and some stray beams and bits of thatching. Recently, however, more definite information

[*] *Antiqua*, 1883, p. 89.

[†] *Corr.-blatt*, 1882, 1883, and B. 401.

[‡] *Mitt. der Anth. Ges. Wien*, B. xiii. pp. 213 and 216.

[§] *Neues Jahrb. für Mineralogie*, B. iii., 1884.

[||] *Archæological Journal*, vol. xxxvi., 1880.

[¶] *Zeit. für Ethn.*, bd. xv. pp. 163—190.

has been brought forward by Mr. Frank, the investigator of the lake-dwelling at Schussenried. This settlement had none of the signs of having been destroyed by fire, and it is supposed that its inhabitants voluntarily abandoned it on account of the growth of the surrounding peat. In this case it is probable that the huts would be allowed to fall into natural decay, but before this happened there was a chance that some part of the buildings would become overtaken by the moss, and so become, as it were, hermetically sealed up. That something like this actually occurred is now proved by the discovery at this station of the foundations and portions of the walls of a cottage deeply buried in the moss. Upon the discovery being known Mr. Frank had the ruins at once uncovered, and before the crumbling materials disappeared there was a plan of the building taken, which by the courtesy of the investigator I had an opportunity of inspecting. The structure was of an oblong rectangular form, about 33 feet long and 23 feet wide, and was divided by a partition into two chambers. On the south side there was a door, a little over 3 feet wide, which opened into one of the chambers. The other, or inner chamber, was somewhat larger, and had no communication with the outside, except through the former by means of a door in the partition. There were no relics found in these chambers, but in the outer there was a mass of stones which showed signs of having been a fire-place. The walls were constructed of split stems set upright and their crevices plastered over with clay. The flooring in both chambers was composed of four layers of closely laid timbers separated by as many layers of clay. These repeated floorings may have been necessitated by the gradual rise of the surrounding peat which ultimately drove the inhabitants away.

Mr. Messikommer (B. 406c) in the course of his investigations at Robenhausen found, over an area of 33 yards long and 10 broad, indications of what he considered to be four separate dwellings. From a study of the peculiar grouping and distribution of the industrial remains over this area he came to the conclusion that each cottage had its own special furniture, a hearth, weaving appliances, a mill-stone, sharpening-stones, etc., and on this principle he determines the size of the huts. From these calculations the size of the Robenhausen cottages would be almost identical with that at Schussenried, each having an area of about 750 square feet. From observations made at Irgenhausen similar results were obtained.

At Niederweil, where the limits of contiguous dwellings were clearly definable, the area assigned to each was found to be somewhat less.

Swiss archæologists pretend to see, in the remains of their lacustrine villages of the Stone Age, evidence of three distinct periods, which are thus formulated by Dr. Gross:—

"Les fouilles que j'ai faites, depuis une dizaine d'années, dans les villages lacustres de l'âge de la pierre, m'ont prouvé qu'ils n'ont pas tous été habités à la même époque, mais qu'ils remontent à trois périodes différentes bien caractérisés.

"Dans la *première période*, je range les stations les plus anciennes, représentées, dans le lac de Bienne, par la palafitte de Chavannes (Tschaffis), près de Neuveville. Les produits de l'industrie humaine trouvés sur ces emplacements, dénotent un art tout-à-fait primitif; les haches de pierre sont petites, à peine polies et presques toutes en minéral indigène; les haches-marteaux n'apparaissent que sous forme de grossières ébauches, et les outils en corne et en os sont mal travaillés. On ne remarque aucune trace d'ornementation, ni sur les armes et les instruments, ni sur les produits de la céramique. La poterie, du reste, est façonnée d'une argile grossière, sans l'aide du tour naturellemente, et revêt des formes qui trahissent l'enfance de l'art du potier.

"La *seconde période*, à la quelle appartient l'ancienne station de Locras, celle de Latrigen et en général la plus grande partie de nos établissements de l'âge de la pierre, présente déjà un notable progrès sur la précédente, en ce que les armes et les outils sont perfectionnés, les haches en pierre, quelquefois perforées pour recevoir le manche, sont fort bien travaillées, polies avec soin et revêtent parfois des dimensions colossales. On constate aussi dans ces stations une abondance relative de hachettes en néphrite, jadéïte et chloromélanite. En effet, tandisque ces objets en minéral étranger font presque entièrement défaut pendant la première et la troisième période, on les rencontre dans les stations qui nous occupent dans une proportion qui peut varier du 5 au 8 % des haches en minéral indigène.

"Le métal n'apparait pas encore dans cette période, ou du moins pas dans la couche archéologique; exceptionnellement, on trouve, ici et là, entre les pilotis, quelques lamelles de cuivre, et plus rarement de bronze.

"La poterie, faite d'une pâte plus fine et mieux façonnée, présente quelques traces d'ornementation sous forme d'éminences percées et de dents de loup.

"Enfin la *troisième période* comprend les stations de l'époque de transition de la pierre au bronze. C'est *l'époque du cuivre*, si je puis l'appeler ainsi, caractérisée par la présence dans la couche archéologique même, d'armes et d'instruments de cuivre pur (très-rarement de bronze), de haches-marteaux habilement perforées, d'outils de bois et de corne très-bien façonnés, et surtout de vases de formes variées, quelques-uns munis d'anses et la plupart ornés de dessins faits avec les doigts ou au moyen de ficelle imprimée dans l'argile encore molle. Comme je l'ai déjà fait remarquer plus haut, les haches en néphrite et jadéïte sont devenues plus rares et font même presque entièrement défaut." (B. 392, p. 2.)

It will be remembered that a similar subdivision of the Stone Age was adopted by M. Borel in his essay on the lacustrine stations along the Bevaix shore. (See page 49.) In my opinion there are no archæological grounds for such a classification; but I retain its nomenclature as a matter of convenience, especially the term "Transition" period. The inhabitants of Schaffis (referred to by Dr. Gross, and acknowledged to be one of the oldest stations in Switzerland), knew and practised the art of boring and sawing stones; they possessed implements of nephrite and jadeite (**Fig. 185,** No. 29), and in the manufacture of the usual flint implements they were, according to Dr. v. Fellenberg, pre-eminent. In the assortment of objects from this station in the Cantonal Museum at Berne are to be seen some fantastically-shaped and perforated clubs of horn and bone, a large needle, and five peculiar objects of horn, similar to those found on so many of the stations of the period of transition as Sutz, Gerlafingen, etc. (Nos. 26 and 27), pieces of cloth, flax combs, a variety of clay weights, stone axe-hammers in all stages of manufacture, well-shaped daggers of flint and bone, flint saws in their wooden handles. On this station Dr. Gross also describes the finding of portions of a ladder; and Dr. Keller (B. 336, p. 48) part of a door or window containing a long bolt (No. 25). It is true that the specimens of pottery are coarse and devoid of ornamentation; but this might have been due to social causes rather than a deficiency of knowledge, as we find that in some of the other early stations, as for example Schussenried, the pottery is highly ornamented. In the struggle for existence the original founders of the lake-dwellings, surrounded by fierce aborigines and wild animals, had to pay more attention to the mere necessaries of life than to art. With the progress of time there are indications of considerable prosperity and a corresponding advancement in culture, but nothing worthy of being characterised as a separate period till the introduction of bronze, which, by facilitating all mechanical and industrial operations, produced a social revolution. But this change was only by degrees, and the overlap of the Stone and Bronze Ages is appropriately designated the period of transition. However long or short the lake-dwellers existed in the pure

Stone Age (in regard to which there is not much evidence), one thing is clear, that during all that time the essential elements of their culture and civilisation underwent little or no change.

II.—TRANSITION PERIOD.

Before proceeding to describe the changes brought about in the social economy of the lake-dwellers by the introduction of the metals, there is an important problem that demands a few passing remarks, viz. the evidence as to the existence of a Copper Age in Europe. The theory of those who advocate the affirmative of this problem, among whom are notably Professor v. Pulszky, of Buda-Pesth, and Dr. Much, of Vienna, is that the pre-historic people of Europe became first acquainted with the art of extracting copper from its ore, which they fashioned both by smelting and hammering into various kinds of weapons, implements, and ornaments. In the first instance these were mere imitations of objects previously in use. Thus the flat axe or celt, almost the only form ever found in copper in Europe (except Hungary), was clearly formed on the model of the stone implements previously in use. Daggers and spear-heads are also imitations of their flint prototypes, as may be strikingly seen by a comparison of **Fig. 7,** No. 11, with **Fig. 8,** No. 2, the former being flint, and the latter copper.

As the very strongest arguments in support of a Copper Age are derived from the number and variety of objects of pure copper that have come to light through lake-dwelling researches, I will endeavour, as briefly as possible, to point out their general bearing on this problem. We have already seen that in many instances celts, daggers, beads, and other objects of copper were found on various stations, but almost invariably associated with bronze objects, as was the case, for example, at Wollishofen. There can hardly be any doubt that the transition from Stone to the most flourishing period of the Bronze Age took place during the occupation of this lacustrine settlement, but to infer that its copper objects were the products of a Copper Age would manifestly be overstepping the limits of a legitimate conclusion. From these long-lived settlements, with their promiscuous contents, we must turn to those which have come, as it were, to a premature end, just shortly after the first metal objects began to be used, but before the full development of the Bronze Age. From such stations in the lake-dwelling area I select the following seven as the most interesting, viz.:—Polada, Laibach, Mondsee, Robenhausen, Locras, Vinelz, and St. Blaise. In the following table I have tabulated all the metal objects that I can find on record, or deposited in local collections, as coming from these stations.

NAME OF STATION.	COPPER.	BRONZE.	REFERENCES.
POLADA ...	—	1 dagger, 3 flat celts,	Dr. Rambotti's Collection, Desenzano, **Fig. 67**
LAIBACH (crucibles)	1 flat celt, 6 daggers and cutting blades, 5 awls, 1 fragment	1 winged celt, 3 pins, 2 swords, 1 ornamented dagger, 2 plain do., 2 bracelets	**Fig. 45**; B. 302 and 317
MONDSEE (crucibles, **Fig. 184**, No. 3).	14 flat celts, 6 daggers, 3 spirals, 3 awls, 1 fish-hook, 2 fragments	1 portion of dagger, 1 hair-pin	**Fig. 39**; Much: *Kupferzeit in Europa*
ROBENHAUSEN (crucibles)	1 flat celt	1 flat celt	**Fig. 24**
LOCRAS ...	4 daggers, 2 awls, 1 double celt (No. 10, **Fig. 186**), 1 bead	1 flat-handed sword, 1 dagger, 2 hair-pins	**Fig. 186**, No. 1; B. 336, p. 33; *Matériaux*, vols. xiv. and xv.; *Antiqua*, 1885, p. 106
VINELZ ...	49 beads (45 of which are in Bern and 4 in Gross Coll.), 9 daggers, 6 awls, 1 flat celt, 8 pendants, 1 spiral, 1 tube, 3 punches, 1 hair-pin, 1 chisel	—	**Fig. 7**; *Antiqua*, 1885, p. 107; B. 462, Pl. xv. and xvi.
ST. BLAISE (crucibles)	5 daggers, 2 portions of flat celts, 3 knives, 3 beads, 4 arrow-points, 2 earrings, 1 spiral	1 dagger with midrib. *Anzeiger*, 1882, Pl. xix. 3	**Fig. 8**; *Antiqua*, 1883, p. 61; *Ibid.*, 1884, pp. 59 and 60; *Ibid.*, 1885, pp. 10, 108; and *Ibid.*, 1886, p. 13

The total number of copper objects tabulated by Mr. Forrer, in his carefully prepared "Statistick der in der Schweiz gefundenen Kupfergeräthe,"* amounts to 250. Of these, 107 are beads or ornaments, and of the remaining number, 37 are flat celts—the rest being chisels, knives, daggers, hammers, etc. The copper finds on the other stations, except the seven here mentioned, may be dispensed with as weakening rather than strengthening the evidence for a separate Copper Age, because there was a preponderance of bronze objects associated with them, as was the case, for example, at Lattringen and Gerlafingen.

Looking now at our seven selected stations we see, from the general character of the relics with which the metal objects were associated, that they belonged essentially to the Stone Age; and it would appear as if the use of the metals had not been sufficiently long known to alter their prevailing character. Now it will be observed that in all these seven stations, except one, viz. Vinelz, objects of bronze were also found associated with those of copper. On the other hand, Polada has yielded only a few bronze weapons, and yet there can be no doubt that this station existed during the earliest Transition period. Nor is it in this respect singular, as at Ober-Meilen there were two objects of bronze, viz. a flat celt and a bracelet, associated with relics of the Stone Age, but none of copper. Also in the transition station at Morges (Roseaux) there were no less than 18 bronze celts of the same type, together with a few other objects of this material, but none of copper. On the supposition that a Copper Age prevailed for any length of time as a preliminary to that of Bronze, it would follow that the station at Vinelz was earlier than the others. The character of its relics does not, however, bear this interpretation, as the perforated hatchets and other relics are more numerous and more elegant than anywhere else, and some of its pottery is highly ornamented and in some respects resembles that of the Bronze Age. The arrow-points and daggers of flint are exceedingly well formed, and among a variety of types of the former there are some with recurved barbs. Also this station is rich in cloth, nets, thread, bone buttons, etc., and corresponds in every respect with that of Locras, on which a sword and a dagger of bronze were found along with a few copper implements. The mere absence of bronze in Vinelz is not a sufficient reason, *per se*, to suppose that it existed in a pure Copper Age without a knowledge of bronze. All the copper objects from the other stations bear the same evidence of primitive workmanship as those from it.

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* *Antiqua*, 1885, p. 138.

On the other hand, the earliest bronze objects, wherever found, such as the swords and daggers, etc., from Locras, Polada, and Laibach, show a totally different and a much higher style of manufacture; but yet there is not even presumptive evidence in favour of the idea that they represent a later date than the crude copper tools and weapons of Vinelz. The contemporaneity of more or fewer bronze objects in the six other stations of the Transition period above named entirely outweighs the exceptional evidence of this one. Admitting that these copper objects were fabricated by the lake-dwellers, a supposition which is rendered highly probable by the finding of so many crucibles at Robenhausen, Mondsee, Laibach, and other places, we must also admit that their fabricators were somehow acquainted with the superior qualities of bronze implements. Consequently the manufacture of these inferior articles must be explained on some other grounds than the supposition of a Copper Age, in the sense that it preceded and gradually developed into that of Bronze. I fancy the true explanation is that the lake-dwellers became first acquainted with metal instruments in the form of imported bronze objects, especially swords and daggers, and that this suggested to them, and directly led to, the discovery of the art of reducing the pure metal from the copper ore. Local or peripatetic coppersmiths, in trying to imitate these imported implements, went on manufacturing copper objects until they learned the art of hardening it by the proper admixture of tin. This knowledge might have been originally kept a great secret. But, however this may be, it is certain that the secret was not long kept, as we soon find the lake-dwellers in full possession of the art of manufacturing all manner of bronze objects. Ignorance of the nature of the alloy or perhaps the scarcity or dearness of tin, leading to wilful deception on the part of the fabricators, may partly account for the production of some of these copper implements. It has also been suggested that the repeated melting of bronze causes the tin to disappear, and that in this way copper objects may have come about. But this explanation is inapplicable to those from the lake-dwellings, as they are all of the most primitive type, and were undoubtedly manufactured during the initiatory stages of the metallurgic art.

III.—BRONZE AGE.

The art of manufacturing cutting implements of bronze, when once known, must have come quickly into general use, owing to their vast superiority over those in previous use, whether of stone or copper. Not only was there a great impulse given to the ordinary affairs of life, but actually new industries must have been developed. In lieu of the primitive weapons and tools previously in use, we have now a splendid array of swords, daggers, lances, axes, knives, rasors, chisels, gouges, sickles, etc. The simple dagger of bone or flint, which could only be used by a thrusting blow, became not only more specialised and a more powerful weapon, but developed into a new weapon—the double-edged sword. The first form of this weapon which found its way to the lake-dwellers appears to have been that with a flat handle (**Fig. 186,** Nos. 1, 7, and 9), with a series of rivet holes for attaching plates of bone or wood, so as to give a better grip to the wielder. Subsequently the handle was cast separately of solid bronze, and the blade was then attached to it by means of rivets. One of the most elegant of these forms was that terminating at the hilt in a couple of spirals, several examples of which are illustrated on **Figs. 11, 19,** and **186.** From Moeringen there is a very rare sword of this type, but portion of the handle is broken off. The blade is of iron and the handle of bronze ornamented with encrusted bands of iron (**Fig. 186,** No. 6).

Such sharp-edged weapons entailed the necessity of caution when carried about the person, and accordingly sheaths were used, probably in the first place made of wood and tipped with bronze. Objects supposed to be these tips have been found at various places, as Moeringen, Auvernier, Champreveyères, Luissel (**Fig. 19,** No. 4), Bourget, etc. (**Fig. 21,** No. 20).

While daggers were riveted to handles of solid bronze, horn, or other materials (**Fig. 186,** No. 8), a form which they retained during the whole Bronze Age, lance-heads were from the earliest times made with sockets. Arrow-points were subject to greater variations, as we find them tanged, socketed, or merely triangularly-shaped flat pieces. The latter had generally two or four small holes by means of which they were fastened to the stem by a wire or thread (**Fig. 21,** Nos. 22 to 26). Hatchets display a series of evolutionary improvements, the various stages of which can be readily traced. Thus the primitive stone form, which was alone adhered to in the few copper examples hitherto found, was also continued in bronze, and in this form the bronze axe spread largely over Europe. But it gradually gave way to that with flaps, or wings, with or without loops for fixing the instrument more firmly to its handle. Finally we have the socketed hatchet, which appears to have been considered the best form in use during the Bronze Age. It was only when iron superseded bronze in the use of cutting implements that the modern type, *i.e.* with a transverse hole for the handle, came into general use, although the principle was well known in previous ages, and, indeed, acted upon, as in the perforated stone hammers and axes. Bronze saws (**Fig. 6,** No. 7) appear to have been used to an extremely limited extent, as only some half-a-dozen examples have been found on the whole lake-dwelling area of Central Europe. Their rarity in comparison with the superabundance of flint saws in the Stone Age may be accounted for by the large number of sharp cutting instruments that were now prevalent, and which were better

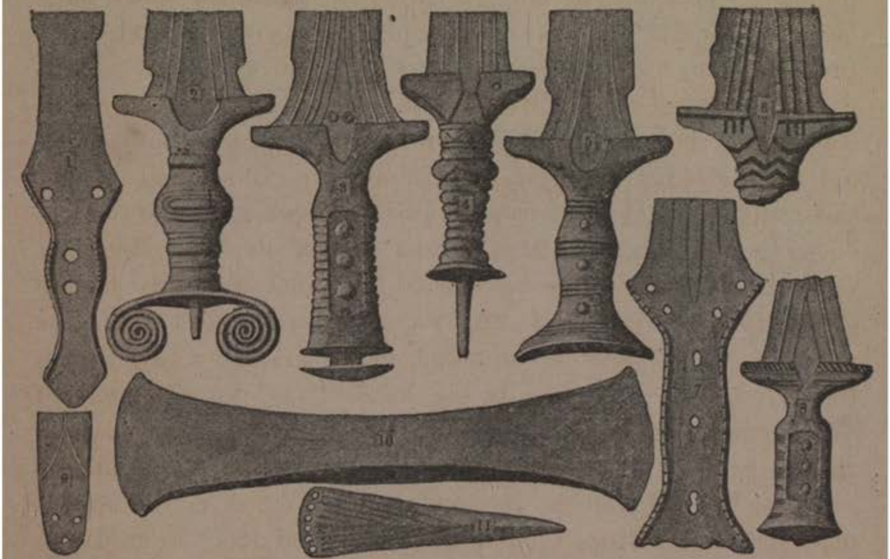

Fig. 186.—BRONZE WEAPONS AND COPPER CELT. Nos. 10 and 11 = $\frac{1}{6}$, and all the rest = $\frac{1}{3}$ real size.

adapted for many of the purposes to which the saws were formerly put, such as the making of arrow-stems, wooden handles, etc. The ordinary knives of the palafittes are extremely elegant in form, the blade being always more or less curved, and frequently ornamented with parallel or wavy lines and running patterns of concentric circles and dots. They were generally hafted by means of a tang or socket, but sometimes the blade and handle were made in one solid casting. Numerous examples of all these different forms are given in our illustrations.

It is interesting to note that the socketed knives are very rare in Eastern Switzerland, not a single example being recorded from the great find at Wollishofen, while, as we move westward, they increase relatively, till in Lake Bourget they become the rule and not the exception.

The blades which go under the name of razors, though of diversified forms, may be divided into two kinds, according as they are single- or double-bladed. The former have a ridged back, which generally projects at one end, so as to become a short handle, often assuming the form of a terminal ring, as shown in **Fig. 20,** Nos. 22 and 23. One in the Gross collection has a handle of staghorn. The latter, or double-bladed, have the handle placed intermediately between the blades, and are common in the terremare and the palafitte of Peschiera (**Fig. 63**), but they do not occur in Lake Bourget. The small pincers supposed to be for epilation, so common in La Tène and in Gallo-Roman times, appear to have come into use towards the close of the Bronze Age, as they are extremely rare in the palafittes of Central Switzerland, but more common in those of Lake Bourget. One is figured by Dr. Gross, from Moeringen, similar to the one here represented from Lake Bourget (**Fig. 20,** No. 24).

Sickles were also widely distributed over the lake-dwelling area of the Bronze Age, including the terremare. They are flat on the under side, but on the upper side they have two or more ridges running lengthways, the object of which was to strengthen the implement. By means of a raised knob, or rivet-hole, and sometimes a projecting spur, it was firmly fixed into a wooden handle, as seen in **Fig. 187.** That represented here was found at Moeringen, and is adroitly fashioned by hollows and rounding ridges, adapted for the right hand. That this was the normal condition of these handles is probable from the fact that other two similar objects were found at Corcelettes, which are now preserved in the Museum at Lausanne.

As regards hammers, chisels, gouges, punches, awls, needles, hooks, and spears for fishing, etc., it is unnecessary to add to the descriptive details already given, and their general characters are sufficiently patent from the illustrations.

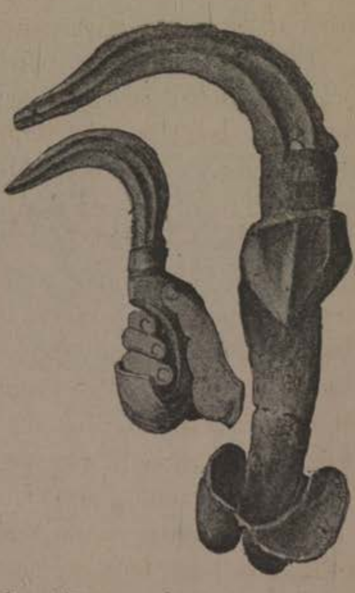

Fig. 187. — Wooden Handle with Bronze Sickle ($\frac{1}{4}$). The smaller figure shows the manner of using this implement.

In the category of objects used for the toilet and personal ornament we have a large assortment of new and fanciful forms, such as bracelets, pendants, necklaces, fibulæ, pins, combs, belt-clasps, finger-rings, buttons, studs, earrings, chains, as well as a few ornaments of gold, amber, and glass.

First in importance are the armlets or anklets, which greatly differ as regards size, form, and ornamentation (**Fig. 188,** etc.) They are closed or open. The former are solid or hollow rings, and either plain or ornamented with the usual geometrical figures of incised lines, circles, and dots variously combined. The open bracelets are more numerous, and have a wider range of style and pattern. Some consist of a stout wire, spirally grooved, in single or double ply (**Fig. 3,** No. 15), or a flat band with a terminal hook and eye for fastening when worn over the arm. Others are penannular, with flat expansions at each end, and the more massive are hollowed in the centre so as to reduce their weight. These latter are peculiar to the palafittes of Western Switzerland, having their greatest development in the lakes of Neuchâtel, Bienne, and Morat. They occur in Lake Bourget, but not to the same extent as the solid forms. Jet bracelets are rare, only one or two being recorded from the Swiss palafittes (**Fig. 11,** No. 14); but they are more numerous in Lake Bourget. One is of tin (**Fig. 188,** No. 3).

Pendants and such like ornaments affect so many different forms that it would be idle here to attempt to classify them. They have all one common element, viz. a perforation or ring at the top for suspension, and it is probable that many of them are merely individual parts of a compound ornament, like that found at Auvernier, and figured by Dr. Gross (B. 392, Pl. xxiii. 33), in which there are no less than fourteen different pendants hanging from a central wheel. But no doubt many of them, especially the larger forms, such as those found on the palafitte at Onens (**Fig. 189,** Nos. 1 to 3), must have been used as single decorations.

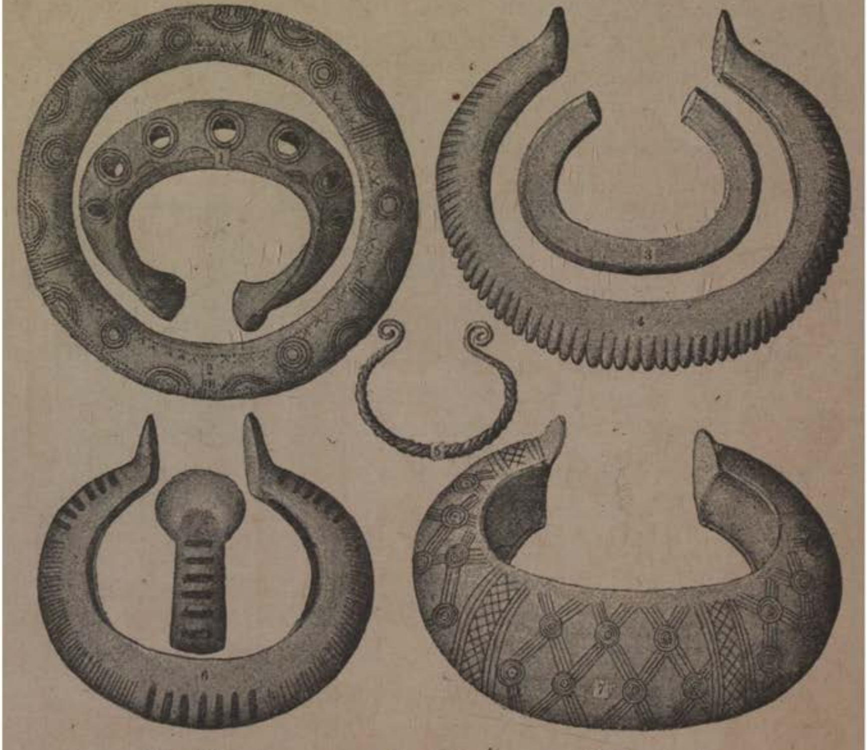

Fig. 188.—Bronze and Tin Bracelets. All ½ real size.

Necklaces formed by stringing together beads of various materials, such as that represented on **Fig. 11,** No. 1, were probably a common method of personal adornment; but of course they are seldom met with except as individual beads. Solid rings for the neck, or torques, are extremely rare, their entire number recorded from the lake-dwellings of the Bronze Age being less than half-a-dozen. They are all of one type, and similar to the two illustrations given in **Fig. 10**, No. 3, from Cortaillod, and **Fig. 63**, No. 19, from Peschiera.

Fibulæ were not quite so rare as the torques, and they appear

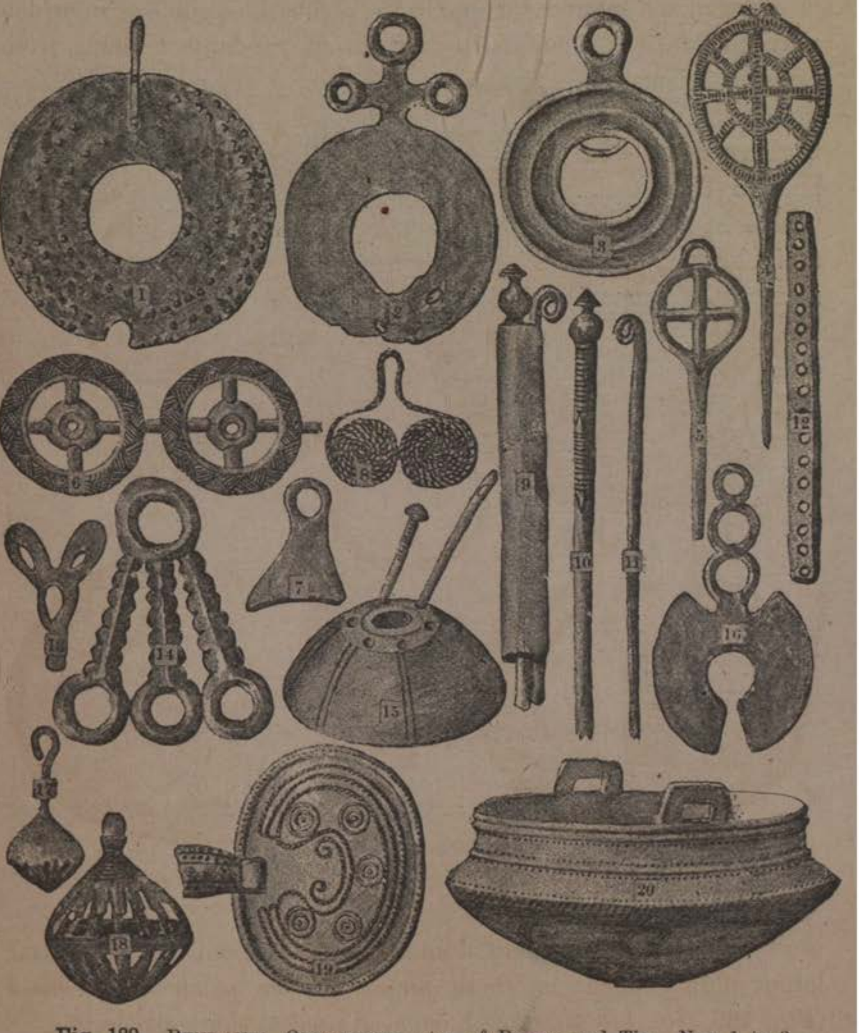

Fig. 189.—PENDANTS, ORNAMENTS, etc., of Bronze and Tin. Nos. 1 to 3, and 17 to 20 = $\frac{1}{3}$, and the rest = $\frac{2}{3}$ real size.

to have been pretty equally distributed over the lake-dwelling area, both north and south of the Alps. Though well represented at Peschiera, their existence in the true terramara deposits is still a matter of contention among archæologists. From a glance at the various examples given in our illustrations (**Fig. 3,** No. 20; **Fig. 6,** Nos. 4, 9, and 10; **Fig. 12,** Nos. 4, 12, 14, and 26), etc., it will be seen that they occupy an intermediate place between the straight pin and the more highly developed and elaborate forms found among relics of later ages.

Pins are the most common objects among the industrial remains of the lake-dwellings, the total number found in the Swiss stations alone being approximately over 10,000. Their principal function was to adorn the hair, but no doubt some were used for other purposes, such as the fastening of garments, and so they took the place of the fibulæ. They are extremely varied in size and style of manufacture, being of all grades from an inch up to 30 inches in length, and from the simple unadorned stem with a mere knob for a head up to the highly decorated examples so numerously represented in our illustrations, such for example as those with massive heads in the form of a hollow globe (**Fig. 13,** No. 12), or cup (**Fig. 3,** No. 9), or expanded disc (**Fig. 10,** No. 24). Some had a loose ring for a head, to which in some instances bits of chains were attached (**Fig. 3,** No. 6). In Lake Bourget a few were found with flat wheel-shaped heads (**Fig. 189,** Nos. 4 and 5).

Bronze combs are fairly well represented both in the terremare and the lacustrine dwellings. They are almost invariably small, with a single or double row of teeth. Clasps for girdles like the one figured from Bourget (**Fig. 20,** No. 25) are in the Gross collection, as well as a few others of a slightly different form. Buttons, studs, chains, finger-rings of single or more coils, ear-rings, glass and amber beads are also so numerous and widely spread as to show that they were not merely exceptional objects among the lake-dwellers.

Several bronze dishes, not exceeding a dozen in all, have been found on several of the Swiss stations. They are in the form of small wide-mouthed cups of beaten bronze, with or without handles, and often ornamented with slightly raised knobs of repoussé work (**Fig. 10,** No. 20), or like small jars of cast bronze (**Fig. 3,** No. 22, and **Fig. 6,** No. 2). Fragments of larger dishes, like the Etruscan situlæ made of thin sheets riveted together, with massive handles also attached by rivets, have been found at Wollishofen (**Fig. 4,** Nos. 17 and 22).

Gold is only sparingly met with, and the objects are generally small or fragmentary. In this condition specimens of the precious metal are among the relics from Nidau, Moeringen (**Fig. 189,** No. 8), Auvernier, Concise, Cortaillod, Montilier, Wollishofen, and Lake Bourget, etc. A few objects are of tin, the most frequently met with being small wheels with four, five, or eight spokes, which are recorded from several stations, portion of a ring and a bracelet from Montilier (**Fig. 188,** No. 3), a small bar pierced with 16 holes from Corcelettes (**Fig. 189,** No. 12), and a pendant from Auvernier (No. 7), a small cross from Lake Garda (**Fig. 64,** No. 26), etc. Tin is also represented in small ingots and, as we shall afterwards more particularly notice, it was used to decorate the inside of various dishes of earthenware.

To these industrial objects, many of which had their prototypes in the Stone Age, we have to add a variety of appliances for carrying on the metallurgical art. Stone anvils gave place to bronze ones, and of these the most remarkable is that from Wollishofen (**Fig. 4,** No. 21). Moulds were generally made of sandstone or hardened clay, the former being the most numerous, and specimens may be seen in all the collections from the stations both north and south of the Alps. It will be recollected that the two valves of a mould for a winged celt made of bronze were found at Morges at a very early stage in lacustrine investigations (**Fig. 17,** No. 8). For many years this apparatus remained as a solitary and unique example of this kind of mould, but now three other valves, similar to those from Morges, have been found, one on each of the stations of Auvernier, Corcelettes, and Estavayer (**Fig. 9,** No. 22). Crucibles are abundantly represented. They are of various shapes and sizes, sometimes with a solid handle, as those from Rohenhausen and St. Blaise, and at other times with a short projection having a perforation through which a wooden stick could be inserted as a handle (**Fig. 184,** No. 3, and **Fig. 45,** No. 14). As further evidence that the founder practised his art *in situ* we have various records of the finding of ingots of copper, tin, and lead; also slag, defective castings, scoriæ and refuse of smelting furnaces. In the Gross collection there is a circular cake of tin with a small ring for suspension similar to a leaden cake figured from Wollishofen (**Fig. 4,** No. 23). The huge mass of copper in the form of a double celt (**Fig. 186,** No. 10) was probably for the same end, and not intended as an implement at all.

In Dr. Evan's collection there is a remarkable bronze knife

(**Fig. 190**) from Bourget, having the handle and blade made of one solid casting, which appears as if it had just been freshly extracted from the mould. It has evidently undergone no subsequent polish, and still retains a thin irregular rim all round, corresponding with the junction of the two halves of the stone mould.

It is not, however, to be supposed that I claim all the multifarious objects found in the *débris* of the lake-dwellings as products of native art; on the contrary, I believe there are many objects, especially the more complicated and ornamental, which can be traced to foreign sources. But on the other hand the mere inspection of the extensive assortment of foundry materials, especially the variety of moulds which include swords (B. 282, Pl. liv. Fig. 2, and B. 392, Pl. xxix. Fig. 11), daggers, spears, knives, sickles, all kinds of celts and chisels, bracelets, buckles, pins, rings, wheels, etc., leaves no doubt that the home industry in the manufacture of bronze was extensive and skilfully conducted. Indeed, the skill and ingenuity displayed in casting such a variety of objects can only excite our astonishment. How the series of involved and massive rings of cast bronze represented on **Fig. 10**, No. 1, was produced, is really a mystery. A model of such an object made of wax if embedded in soft clay, and subsequently hardened by exposure to heat so as to melt the wax and thus allow it to escape, might supply the founder with the requisite mould. But that this was the method adopted by the lacustrian founder is, of course, a mere conjecture.

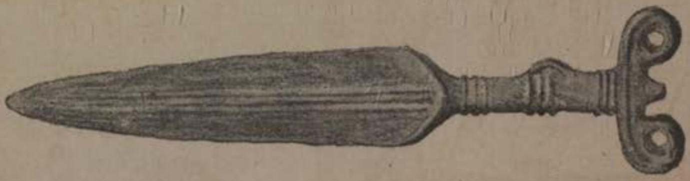

Fig. 190.—Bronze Knife ($\frac{1}{3}$).

That the horse was now domesticated and under the control of the lake-dwellers we have very circumstantial evidence in the discovery of bridle-bits, various ornaments for harness, and even a wheel and other mountings of a chariot or biga. For many years some curious and highly polished portions of horn from 4 to 7 inches in length, and perforated with three or more holes, one in the centre and the other at the extremities, were among the unexplained relics of the Bronze Age stations (**Fig. 191,** Nos. 3 and 4). The holes in these objects had a worn appearance, and it was noticed that the direction of the central aperture was

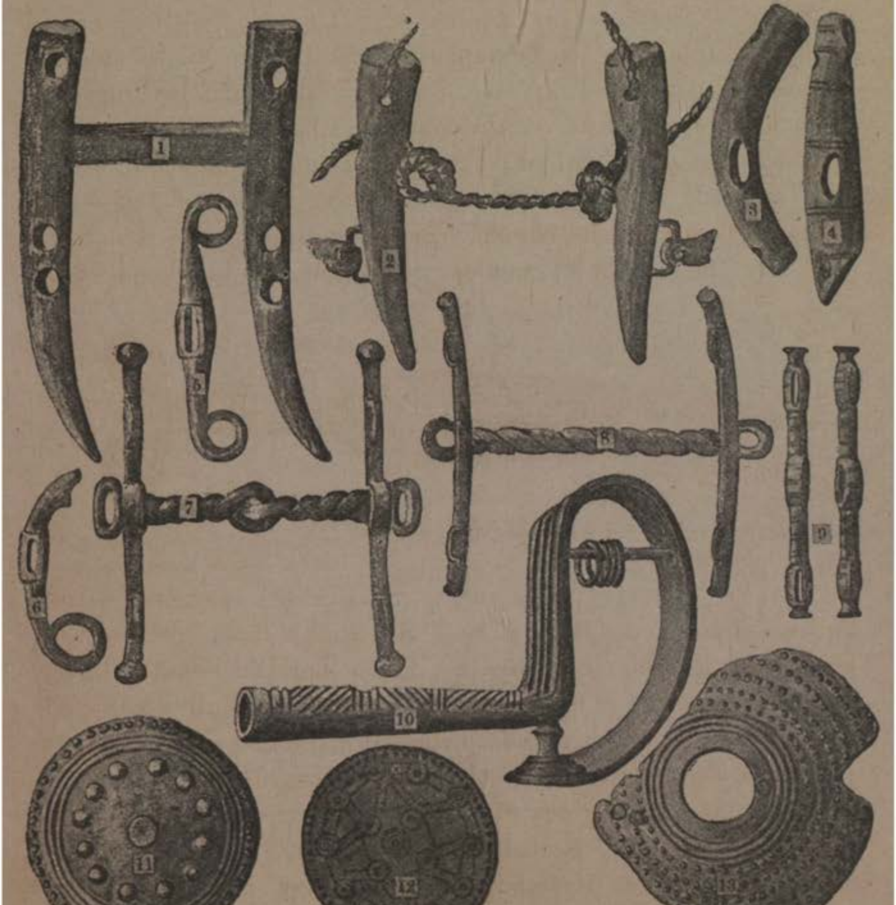

Fig. 191.—Bridle-Bits, Horse Trappings, etc. All $\frac{1}{3}$ real size.

always at right angles to those at the extremities. Their use however, remained a complete puzzle till the year 1872, when a remarkably fine and well preserved horse-bit of bronze was discovered at Moeringen (No. 7). The similarity of these horn objects to the side pieces of the bronze bit led to the conjecture that they were the analogous parts of horse-bits made of horn.

The subsequent discovery of several other bronze bits, all of the same type, gradually strengthened this opinion; but whatever doubt might remain as to their function is now dispelled by the discovery at Corcelettes, in 1888, of a complete specimen made of two tines of staghorn with a transverse mouthpiece of bone (No. 1). Of the bronze bridle-bits found up to this time only three are entire, but there are several isolated side and centre pieces from the stations of Nidau, Moeringen, Auvernier, Corcelettes, and Estavayer (Nos. 5, 6, and 9). It will be observed that all the examples here figured (which include the most diverse forms), though differing in some details, are of the same type. The only marked difference in the two entire specimens is that one (No. 7) has the mouthpiece divided in the middle, whereas the other (No. 8) is one solid piece. This latter was found at Corcelettes and is now in the Lausanne Museum. The third entire specimen, which was also found at Corcelettes, appears from its illustration (B. 462) to be identical with No. 8.

According to Dr. Gross, No. 7 was made in one casting, thus proving the perfection to which bronze working was carried. All these specimens of horse-bits, so far as can be judged from the breadth of the mouthpiece, indicate very small horses, No 7 being 3½ inches between the side pieces, and No. 8 rather less than 4 inches.

The entire bridle-bit of horn is even still smaller, being only 2¾ inches wide. It is thus described by Dr. Brière (B. 461):—

> "Cette intéressante pièce, en parfait état de conservation, se compose de 2 branches en bois de cerf, percées chacune de 3 trous evidées à la partie supérieure sur un profondeur de 3 centimètres et mesurant 18 centimètres de longeur, reliées entre' elles par la barre du mors qui est en os et mesure exactement 7 centimètres entre les 2 branches. Cette barre en os est creuse et pour assujettir la pièce aux branches, on a enfoncé de petits coins en corne de cerf pour combler le vide et pour la rendre solide."—*Antiqua*, 1888, p. 37.

Judging from the frequency with which the isolated side-pieces of bridle-bits made of horn have been found on almost all the bronze stations, no less than 12 being now preserved in the Munich Museum from Starnberg, and 14 in the Lausanne Museum from Corcelettes, the horse must have been common among the lake-dwellers. It will also be remembered that similar objects have been found in the terremare, and Dr. Carlo Boni thinks that a piece of rope was used instead of the stiff mouth-piece in the manner shown in No. 2.

There are various other objects which are supposed to have been used as ornaments for horse harness, such as the *phaleræ* or bronze discs, rings, knobs, etc. The former (Nos. 11 to 13) are often slightly convex on one side and decorated with circles or small knobs formed in repoussé work, and on the other side there is a small loop for fastening it. Several horn and bone discs, especially those from Štarnberg (**Fig. 36**, Nos. 24 and 30) suggest a similar usage.

Two curious bronze objects (**Fig. 191,** No. 10) found on the eastern shore of Lake Neuchâtel, one at Chevroux and the other at Estavayer, together with portion of a hollow tube of a similar style of ornamentation, remained for a long time unexplained. However, coupled with the bronze wheel found at Cortaillod (**Fig. 10,** No. 17) Dr. Keller showed that they were the handles and part of the top railing of an Etruscan biga or war chariot. (B. 336.)

The use of the long pins of brass with sword-like handles (*Säblenadeln*) found on the stations of Wollishofen (**Fig. 4,** Nos. 9 and 10), Grosser Hafner (**Fig. 2,** No. 32), and the Grand City of Morges, is not yet sufficiently understood. In 1886 Major v. Tröltsch,* in a note to the Society of Anthropology in Berlin, directed attention to the fact that an object of the same kind was preserved in the Museum at Donaueschingen, which had been found in a Burgwall (*Lagerplatz*) on the Hohenhöwen, "einem der vulkanischen Bergkegel des Hegau's bei Singen." The object thus described by Major v. Tröltsch is precisely similar to that here figured from the Grosser Hafner (**Fig. 2,** No. 32). Its total length is 16½ inches, of which the pin takes up 13 inches and the terminal ring 1⅝ inch. The stem presents a square section, and in this respect it agrees with the examples found at Zürich and Morges. Subsequently Dr. L. v. Rau,† Mr. R. Forrer,‡ and Mr. Heierli § contributed to the Society some further notes on these singular implements, but without coming to any agreement as to their function.

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* *Zeit. für Ethn.*, vol. xviii., *Verhand.*, p. 83.

† *Ibid.*, p. 411.

‡ *Ibid.*, vol. xix. p. 97.

§ *Ibid.*, p. 140.

In addition to these bronze relics so numerously described and illustrated in the previous pages, there are many objects which cannot be classified under any of the previous headings, as their use is unknown. Fragments of small hollow globes are supposed to have been used as children's rattles. Examples of these have been found at Moeringen made of pottery, two of which, now in the Museum at Berne, are still perfect (**Fig. 193,** No. 9). Both objects are ornamented, and contain inside a piece of hardened clay which, when shaken, makes a jingling noise. In the Museum at Zürich there is, also from Moeringen, a small pendant like a bell now used on horse harness (**Fig. 189,** No. 17). Dr. Gross (B. 392, p. 75) describes a similar object found at Auvernier (**Fig. 189,** No. 18) as a perfume-box (cassolette). Among the more recent finds is the object represented on **Fig. 192,** which is supposed to be part of a mirror similar to those so frequently met with among Etruscan and Roman remains. (B. 420, p. 167.) We have already observed that on several of the Scottish crannogs there were found some thin stones, highly polished and circular or square, which are supposed to have been used for the same purpose. These stones, when moistened with water and looked at in certain conditions as regards light, are by no means a bad substitute for the more perfect reflecting mirrors of the present day.

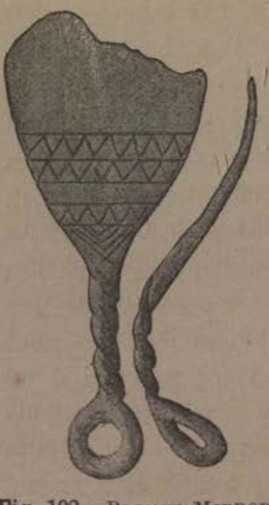

Fig. 192.—Bronze Mirror from Port Alban (⅓).

These great innovations following in the wake of the metals could hardly fail to influence such a plastic art as that of the potter. Accordingly we find a better quality of paste, greater variety and elegance of form, and some approach to systematic decoration. There is one new form quite characteristic of this age which, were it not for the extreme elegance and harmony of all its parts, one would suppose indicated a retrograde movement. This was a small water-bottle-shaped vase, which, having a conical base, could not be made to sit upright upon a flat surface without some kind of support. This support is supposed to be a clay ring (**Fig. 2,** Nos. 2, 5, and 31), great numbers of which have been found in the Bronze Age stations. Ultimately colouring materials were introduced which considerably enhanced the effect of ornamentation on the dishes. Besides systematic patterns of recurring geometrical figures formed by lines in the soft clay, we sometimes find similar patterns traced on the surface of the vessels by means of thin strips of tin-foil made to adhere by means of a kind of gum or asphalt. The vessels thus manipulated were of extremely elegant forms, and made of a fine paste with a smooth black surface. This custom was particularly prevalent in Lake Bourget, but specimens have been found in some of the other lakes, as at Nidau, Hauterive, Cortaillod, Montilier, Estavayer, etc., but it is extremely rare in Eastern Switzerland. On **Fig. 193** I have shown a few additional specimens of pottery. No. 1 is the quarter of a dish shaped like a milk plate having a small flat base. It is perforated with groups of holes arranged systematically as shown in the illustration, and the inside is ornamented with a few incised circles. This dish, or rather percolator, was found in Lake Bourget, and formed part of Mr. Rabut's collection now in the British Museum. Another percolator, of similar shape and size, differently ornamented, and having a slight variation in the disposition of the grouped perforations, was found at Montilier, and is figured by Keller. (B. 126, Pl. v. 26.) No. 2 represents the quarter of a dish of the same form as the above, but without perforations. Its interior is adorned with strips of tin-foil (here represented in white) producing a wonderfully complicated design. This dish was found at Cortaillod, and is now in the Schwab Museum, along with an extremely handsome wide-mouthed vase, also from Cortaillod, the outside of which is similarly ornamented. In the latter case the upper part of the vessel is surrounded by small panels all having different designs made of circles, lines, and crosses. (See B. 126, Pl. xvi. 1.) No. 6 is a vase with conical base, from Hauterive, also adorned in the same fashion. In looking at these vessels ornamented with tin it is difficult to make out the designs, as the tin is now even blacker than the pottery. Hence, in Nos. 4 and 5, both of which are from Lake Bourget, the tin is represented by the dark lines. No. 3 represents a fragment of pottery, now preserved in the Museum at Aix-les-Bains, which shows how a broken dish had been mended by passing two or three plies of a tough grass or rush through a perforation on each side of the crack. After the fragments were thus brought together one of the rushes was twisted in a spiral manner round the others, evidently for protecting them from wear and tear. The remaining Nos. (7 to 10) illustrate some toy dishes and children's playthings from Moeringen and Auvernier.

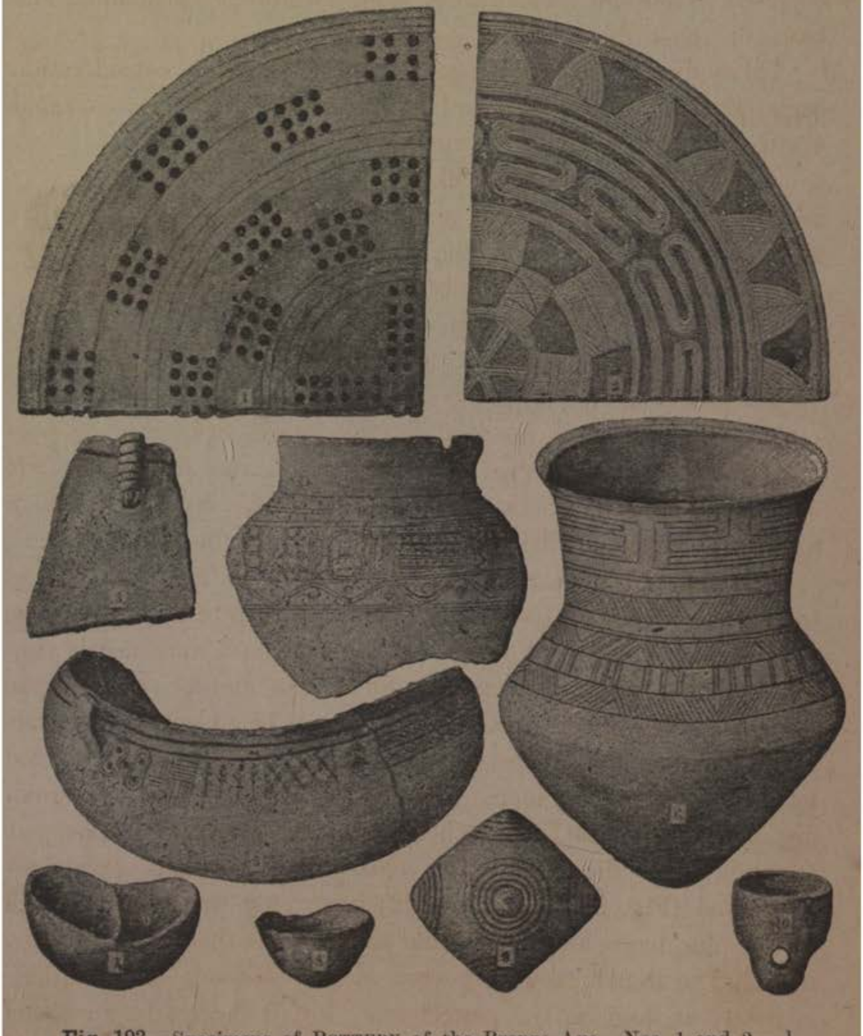

Fig. 193.—Specimens of POTTERY of the Bronze Age. Nos. 1 and 2 = ¼, and the rest = ½ real size.

The spindle-whorls of the Bronze Age are generally made of earthenware, and often highly ornamented, thus showing the improved taste of the people.

Among the more notable objects peculiar to the Bronze Age are certain polished stones, in the form of circular or oval discs with a marginal groove (**Fig. 194**). These stones were formerly reckoned to be sling-stones, but now they are generally recognised as potters' implements, used probably for fashioning the bases of the dishes.

There are many problems worthy of careful consideration suggested by the facts disclosed in these pages, but in this rapid sketch I can only refer to one or two in a cursory manner. First of all we have to inquire if the lake-dwellers practised religious rites. In support of the affirmative to this inquiry there are some indications, and the few objects capable of such an interpretation are illustrated on **Fig. 195**. In this category I include the following:—

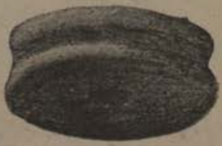
Fig. 194.—Discoidal Stone (½).

(1) The highly ornamented wooden sticks or *bâtons de commandement*, from Castione (Nos 1 and 2), and from Moeringen (No. 3). The only perfect example (No. 1) is rather less than sixteen inches in length, and the others do not appear to have been larger.

(2) The four remarkable bronze tubes with ring appendages from Lake Bourget (Gresine). These, though differing in size and some other respects, are all of one type, and were clearly conceived and wrought out on a uniform plan, and for some specific purpose. The most perfect of these objects (see page 102) appears to be complete, and consists of an ornamental tube, surrounded by three rows of fixed loops, three in each row, placed at regular distances, and to each loop there are three loose rings appended, as shown in the illustration (No. 4). The two previously illustrated (**Fig. 21,** Nos. 1 and 2) have only one ring in each of the nine loops, and it does not appear that there had been any more. The fourth, now preserved in the Museum at Chambery, is nearly as large as the perfect one; but it is greatly worn, and retains now only a few rings, some of the loops being broken or worn through. It is illustrated by Perrin. (B. 282, Pl. lxiv. 1.)

(3) The ornamental reniform rings *(Schwurring)* from Morges and Thonon (**Fig. 17,** Nos. 2 and 3), could not have been used as bracelets, and Dr. Forel suggests that they are analogous to the *armilla sacra* on which the ancient Germans were wont to place their hands when about to swear a solemn oath. (B. 286, p. 46.)

In the Museum at Brunswick, in Germany, I noticed three of these rings, one of which is almost identical with the one from Morges, differing from it only in the details of the ornamentation; but of their history and origin nothing seems to have been known. Another is in the Museo Civico, at Turin, as well as a large circular ring like that from the lacustrine station at Wollishofen (**Fig. 188,** No. 2), both of which have been figured by Gastaldi. (B. 294, Pl. xii.) I believe it more probable that

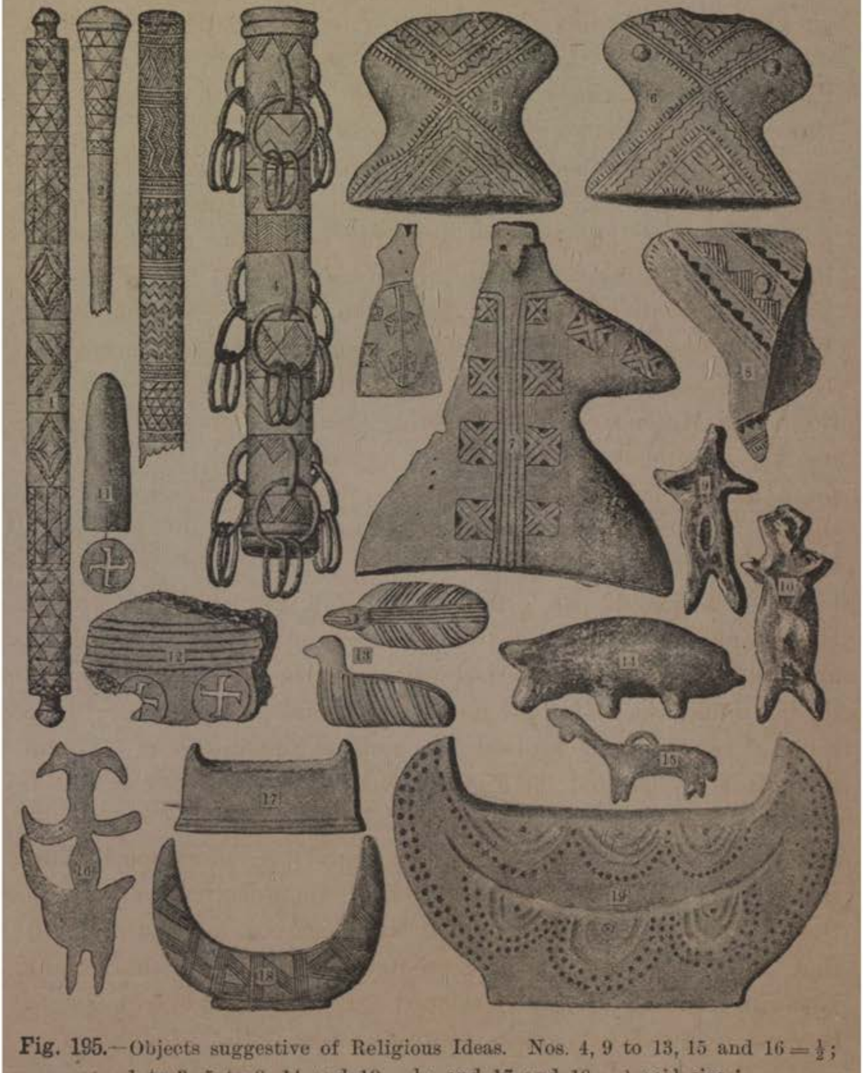

Fig. 195.—Objects suggestive of Religious Ideas. Nos. 4, 9 to 13, 15 and 16 = ½; 1 to 3, 5 to 8, 14 and 19 = ¼; and 17 and 18 = ⅛ real size.

these large circular rings, though generally considered to be bracelets, were used for the same purpose as the reniform rings. Among the objects in the pre-historic and Roman collection of antiquities in St. Ulric, at Regensberg (Ratisbon), there is a large hollow ring of bronze, ornamented with three lines of concentric circles, which measures six inches in external and three inches in internal diameter, thus leaving one and a half inch for the thickness of the ring. It was found, along with several other things, in a pre-Roman grave (*Hügel-grab*) near Velburg.

(4) The clay images of animals found on several stations in different parts of the lake-dwelling area, as well as those of the terremare (**Fig. 84,** Nos. 23 and 24), and more especially the human images from Laibach, are probably idols. On **Fig. 195,** along with four clay figures from the lakes of Neuchâtel and Bourget (Nos. 9, 10, 13, and 14), I represent two of bronze (Nos. 15 and 16), which I noticed in a collection from Bodmann, in the Steinhaus Museum, at Überlingen. One of these was evidently used as a pendant, and the other appears to have been intended for a human being. The clay figures from Laibach (Nos. 5 to 8), though fragmentary, are undoubtedly representations of the human body. Nos. 5 and 6 represent the back and front view of the trunk of a female, while No. 7 shows a human body with a prominent nose. These two figures are hollow in the interior, and richly ornamented exteriorly with designs which are supposed to be imitations of embroidered garments. Another of these human figures from Laibach, as well as the image of a small animal, is represented on **Fig. 42,** Nos. 11, 23 and 24.

The extraordinary number of implements and chips of nephrite found at Maurach, and the equal predominance of flint refuse and implements in all stages of manufacture at some of the other stations, as Wallhausen, Nussdorf, etc., suggest the idea that the various industries prosecuted by the inhabitants of the lake-villages had already developed to such an extent as to become localised in certain centres. Again, the localisation of certain industries, as comestibles in one place, flax in its various preparatory stages in another, the complete kit of foundry tools in a third, etc., all point to the knowledge and practice of the principles of the division of labour.

That the lake-dwellers kept up commercial relations with foreign countries is proved by their possessing materials, not only peculiar to distant or limited areas, such as amber, jade, flint, etc., but also certain objects having such peculiarities in form or style of ornamentation as have enabled experienced archæologists to trace them to their original areas of evolution. Thus at Corcelettes were found an ornamental bronze dish, and portion of a fibula (**Fig. 189,** Nos. 19 and 20), which, when seen by Montelius in the Museum at Lausanne, were at once recognised by him as of northern origin. (B. 348.) Dr. Keller has also shown, as already stated, that certain bronze objects found in the Lake of Neuchâtel, which for a long time remained a puzzle to archæologists, belonged to an Etruscan carriage or biga. The few fibulæ found in the Swiss lake-dwellings have also been traced to their native habitats in Northern Italy.* The half-moon-shaped flint knives, so characteristic of Scandinavia and Northern Germany, have been found as far south as the Mondsee, and one solitary representative (**Fig. 34,** No. 20), now in the Museum of Natural History at Stuttgart, is said to have come from Schussenried station.

One notable fact about the distribution of lake-dwellings is that their relics conform in style, ornamentation, and general characteristics, to contemporary antiquities in the surrounding districts; and I find no special characters in their industrial remains that bind the lake-dwellers together as one clannish people. The relics from the lake-dwellings of the Stone Age in Northern Germany are readily seen to be closely related with those of the Scandinavian archæological area. Whatever the original resemblances and points of agreement of the founders may have been, they were soon modified and adapted to the physical conditions and requirements of their environments.

That continued attention was paid to the rearing and breeding of domesticated animals during the Bronze Age is attested by their osseous remains, which have been critically examined by such competent authorities as Rütimeyer (B. 42), Studer (B. 404), Uhlmann (B. 336), and others. While the lake-dwellers of the earlier Stone Age had only as domestic animals one small species of dog, a small ox, a horned sheep, and the goat, we find that towards the end of this period and during the succeeding Bronze Age not only new and large breeds were developed, but another was added to the list, viz. the horse. From the remains of the domestic horse found at Moeringen and elsewhere it appears to have been a small and slender-limbed animal with small hoofs, and altogether much inferior to the wild horse as hunted and eaten by the cave men of palæolithic times, from which it is supposed to have been a direct descendant. When the Aar canal was being excavated the bones of the smaller or domestic horse were found associated with bronze objects in no less than nine different localities, all of which agree with the above characteristics. (B. 404.) The horse of the terremare, according to Professor Strobel, presents the same characters as that of the Swiss lake-dwellings, and as we have already seen from the bridle-bits and other horse trappings, there can be no doubt it was also in a state of domestication. I may also mention that a skull found at Auvernier was believed by Rütimeyer, after most careful deliberation, to be that of the ass. Professor Strobel has also recognised the osseous remains of the ass in the terremare. (B. 389b.) The sheep diverged considerably from its earlier form, and lost much of its goat-like appearance, being now larger, and developed into various breeds. Still more varied were the breeds of cattle, especially in the vicinity of the lakes of Bienne and Neuchâtel. The Bos primigenius appears to have been tamed and crossed with the earlier type, giving rise to a variety of breeds, such as *trococeros* and *frontosus*, one of which had wide branching horns, as is proved from its remains found at Concise, Chevroux, Locras, etc. The small dog of the Stone Age (*Canis domesticus palustris*, Rüt.) gave place to a much larger kind, somewhat resembling our modern greyhound. The domestic pig also appears to have passed through various evolutionary phases; but the wild boar still retained its individuality intact. Dr. Uhlmann in his report on the osseous remains from the Grosser Hafner, at Zürich (B. 336), describes three varieties of the pig, as well as three of cattle.

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* Castelfranco: *Bul. Palet. Ital.*, Anno iv. p. 50.

With the exception of the domestic fowl and the tame cat, the domestic animals reared by the lake-dwellers were similar to those now extant. Nor is there much change as regards the wild animals and birds then prevalent. The animals that now frequent the higher Alps, such as the marmot, chamois, and wild goat, are very scarce in the lake-dwellings, showing that already nature had consigned them to the zone of their present habitation. Altogether, with the more improved weapons of the Bronze Age, there ensued, according to Rütimeyer, a marked diminution in the relative proportion of the ordinary wild animals of the chase, and a corresponding increase in those of the domestic breeds. The great wild oxen, the urus and bison, disappeared from the neighbourhood altogether.

Such progressive strides in agricultural pursuits are, however, not discernible in the vegetable remains, notwithstanding the minute investigations of Professor Heer. (B. 123.) From the very commencement the lake-dwelling colonists cultivated flax, two or three varieties of barley and wheat, millet and peas. The only addition that appears to have been made in the Bronze Age were the oat (*Avena sativa*), and the dwarf field bean (*Faba vulgaris*) of a strikingly small size. On the other hand we have to note the absence of winter wheat, rye, hemp, and most of the culinary and garden vegetables. Fruits and berries were largely used as food, but there is no evidence to show that they were cultivated. Among these the following have been identified:—apples, pears, plums, sloes, one or two species of cherry, raspberries, blackberries, and strawberries, hazel and beech nuts, water-chestnuts, poppies, etc. Grape-stones from Wangen were hesitatingly included in Professor Heer's list of fruits from the lake-dwellings; but, as already mentioned, this doubt is now diminished by the finding of grape-stones at Steckborn, another station of the Stone Age. Stones of the grape were early recognised among the *débris* of the palafittes of Lake Garda, and quite recently Mr. A. Goiran has identified those of the olive (*Oleo europœa*) and peach.*

Bread was made only of wheat and millet, that of the latter generally containing some grains of wheat and linseed. Cakes made of the seeds of the poppy were also found at Robenhausen.

Various portions of the osseous remains of man, comprising the skull and other portions of the skeleton, have been found in several stations, as Meilen, Wollishofen, Grosser Hafner, Schaffis, Sutz, Locras, Vinelz, Nidau, Wauwyl, Bevaix, Insel Weerd, etc. All these remains have been more or less critically examined and reported on by Virchow (B. 305 and 433), Studer (B. 419 and 432), and Kollmann (B. 420), but notwithstanding a number of minute measurements and learned disquisitions, contradictory opinions are held by these scientists as to the race or races of men that inhabited the lake-dwellings. Dr. Studer advocates the theory of Troyon, that with the introduction of bronze there was also a new race of people, and this opinion he bases on the fact that at Sutz and Vinelz two kinds of human skulls were found, viz. *brachycephalic* and *dolichocephalic*, whereas in the pure Stone Age stations only *brachycephalic* skulls were met with. Segments of the upper parts of human skulls supposed to have been used as drinking cups were found at Gerlafingen (B. 392, p. 107), Sutz, Schaffis, and Locras, and from the latter there was also a skull having a circular portion of it cut out, as if trepanning had been performed. (B. 336, p. 31.)

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* *Nuovo Giornale Bot. Ital.*, vol. xxii., N. 1, 1890.

Although it is now pretty well established that in these prehistoric times trepanning was practised as far back as the Stone Age,* it does not appear that this skull from Locras (B. 336, Pl. v. 28) had been operated on during the lifetime of the individual. Roundlets, cut out of skulls, are supposed to have been used as charms, and they are frequently met with in the graves of the period. From the lake-dwellings two of these objects have been recorded; one from Concise (**Fig. 185**, No. 20)† has two small perforations for suspension, and another, with one hole, is figured by Dr. Gross. (B. 392, Pl. xxiii. 65.) On the Trajan column a Dacian village is represented having human skulls set on poles before the walls. (B. 164.) The finding of skulls of a different race in the lake-dwellings might therefore be accounted for on the supposition that they were trophies of their enemies and not those of the occupiers of the lake-dwellings. Anatomical deductions from the few long bones of skeletons that have come to light indicate, so far as the evidence goes, that the Bronze Age men were of small stature—a conclusion which is also supported by the small size of the handles of the swords and other weapons of the period.

Professor Virchow in a long review of the craniology of the Swiss lake-dwellers comes to the following conclusions (B. 433, p. 300):—

(1) In the stations of the pure Stone Age, brachycephalic skulls only are known to a certainty to have existed.

(2) In the Transition period, both brachycephalic and dolichocephalic are known.

(3) In the full Bronze period the skulls are more inclined to the dolichocephalic type.

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* An excellent summary of the evidence establishing this fact is given by Baron de Baye in his recent work "Archæologie Prehistorique," chap. vi.

† *Zeit. für Ethn.*, vol. xviii., *Verhand.*, p. 368.

(4) The people of La Tène were of a highly mixed character, among whom, however, brachycephalic types predominated.

The eminent Berlin anthropologist thinks that during the Bronze Age a new people joined the original lake-dwellers by degrees, but not as one great immigration subverting the previous order of things. This opinion seems to be greatly strengthened by collateral circumstances. We have already seen how gradually bronze was introduced among the lake-dwellers. No violent disturbance of the previous conditions of life is anywhere to be detected. The original system of constructing lake-villages is continued exactly the same, and the only changes are such as can be accounted for by the use of better implements. The lake-dwellings of the Bronze Age are built in deeper water, and consequently farther from the shore than those of the Stone Age, and the piles are more slender, often stems split into two or four. The steinbergs appear to have been discontinued, or were only used over a hard and stony shore into which piles could not be easily driven. The sites of the latest villages are on the same ground as, or in close proximity to, those of the earliest ones. Remains of cottages are still the same, viz. bits of plaster, with marks of round timbers, and some hearth-stones. From Lake Bourget there are portions of clay plaster of this character, ornamented with incised lines and the impressions of groups of concentric circles (**Fig. 21,** No. 15) or the swastika (**Fig. 195,** No. 12). Also from the same place there are bits of clay tubes, the interiors of which are blackened with soot, supposed to have been small chimneys (**Fig. 184,** No. 8).

In Eastern Switzerland and the Danubian valley the number of stations greatly decreased during the Bronze Age, while in the Lake of Geneva they rather increased, and in Lake Bourget its eight stations belonged almost exclusively to this period.

The stations at Laibach, the Mondsee, Attersee, and Schussenried came to an end in the Transition period, and to the east of Lake Constance only one, viz. that in the Starnbergersee, continued during the Bronze Age. In the lakes of Constance, Zürich, Neuchâtel, Morat, and Bienne, they were also greatly reduced in numbers; but, on the other hand, they occupied larger areas, and show a greater concentration to selected localities, often the outlets of the lakes.

It was not till 1876 that any sepulchral remains bearing on the question—how the lake-dwellers disposed of their dead—came to light. In this year some workmen engaged in digging the foundation for a house in the vicinity of the site of the lake-dwelling at Auvernier, and some 50 yards from the shore, came upon a large flagstone measuring 5¼ by 4¼ feet, which turned out to be the covering of a stone coffin containing the remains of 15 or 20 skeletons. The grave was constructed in the usual way by setting four large flags on edge, which formed its sides, and over them a fifth was laid as a covering. These upright flags were of granite and gneiss, and the largest measured 6¼ feet long, 6 feet wide, and 11 inches thick. The rectangular space thus enclosed measured 5 feet 3 inches long, 3 feet 8 inches wide, and 5 feet 10 inches deep. Dr. Gross, who superintended the clearing out of its contents, states that the bodies had been placed in a sitting posture round the grave, with the heads to the walls and the feet directed towards the centre. External to this cist, on two of its sides, there was another series of upright flags, which formed two smaller chambers, and in one of them there were also human bones.

The relics associated with this burial consisted of some perforated teeth (boar, bear, and wolf); a small polished bone disc, perforated (**Fig. 196**, No. 3); two small stone celts—one with a perforation for suspension in the end opposite the cutting edge. Of bronze objects, found actually in the grave, there were only three, viz. a plain pin 6¼ inches long (No. 1), a small ring (No. 6), and a bead which looked like copper (No. 2).

Six feet to the east of this tomb, and about the same depth, the workmen subsequently came upon the skeleton of a child buried simply in the earth without any stone coffin, and near it were found the following objects:—Two pairs of small oval bracelets (Nos. 4 and 5), a curious pendant like a stud (No. 7), and an amber bead.

Two of the human skulls were sent to Rütimeyer, who pronounced them to be of the *Type de Sion,* and identical with those he had already examined from several lake-dwellings at Nidau, Meilen, Robenhausen, and Wauwyl.

From these data it would appear that the tomb of Auvernier belonged to the Transition period. (B. 286.)

In 1876 and 1877 several interments were found near the quay at Montreux, some with, and some without, stone cists, and along with them were associated various relics, as bracelets (Nos. 10 and 11), hair-pins (Nos. 12 and 13), some pottery ornamented with geometrical figures (No. 14), flint knives, a small stone crescent, and a horse's tooth much smaller than those of our modern horse. (B. 336.) Again, in 1884, some more tombs were discovered near the same place which yielded objects of the Bronze Age, viz. a bronze pin, six bronze bracelets (Nos. 8 and 9), and two or three urns (*Antiqua*, 1884, p. 101).

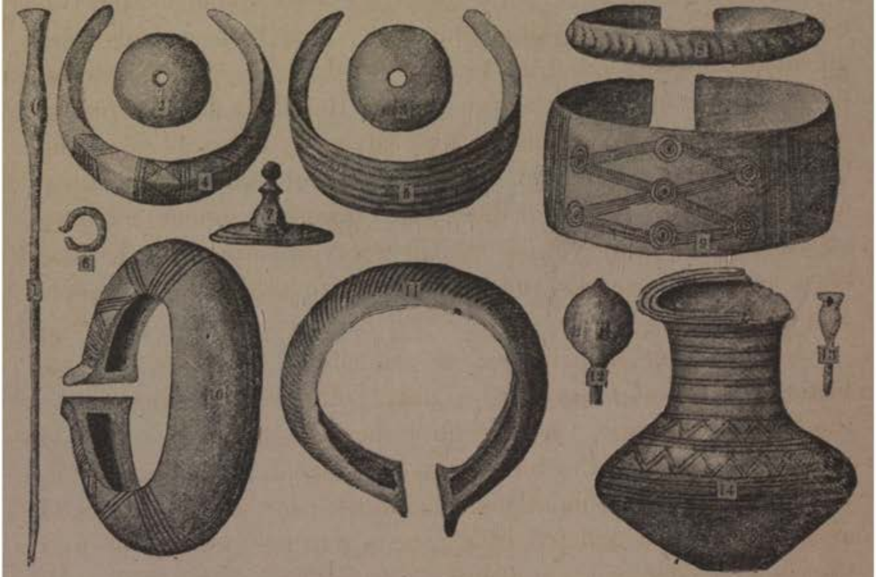

Fig. 196.—Objects from Tombs of the Lake-Dwellers of the Bronze Age. No. 14 = ⅓, and the rest = ½ real size.

Dr. F. A. Forel (B. 286, p. 48) describes "cimetières de l'époque lacustre" in the vicinity of Morges and St. Prex. In the former group some skeletons were found in stone cists, one of which had two bracelets still adhering to the bones. "Ces bracelets," says Dr. Forel, "qui sont actuellement au musée cantonal de Lausanne, et à la bibliothèque de Morges, appartiennent incontestablement par leur beau travail et leur ornamentation riche et très-caractéristique à la belle époque du Bronze, à l'époque de la grande cité de Morges." In the cemetery near St. Prex were found some thirty skeletons deposited in free earth, and associated with them were some bronze ornaments (une vingtaine de bracelets, épingles à cheveux, anneaux, etc.), which, according to Dr. Forel, incontestably belonged to the *bel Age du Bronze.* Moreover, in the very same place, and almost alternating regularly with the free burials, there were urns containing ashes and charcoal. One of these urns (still preserved at the date of Dr. Forel's description, 1876), which measured 6¼ inches in diameter and 5 inches in height, presented all the characters of the pottery of the lake-dwellings of the Bronze Age.

It is interesting to note here the association of the two modes of burial in the same cemetery. That both systems were prevalent in Switzerland, at least as far back as the Transition period, has recently been shown by Mr. Heierli in his description of "Eine Gruppe prähistoricher Gräber," and "Vorrömische Gräben im Kanton Zürich." As the result of these investigations he proves that burnt bodies were deposited under mounds, associated with clay vessels which were ornamented with dots, lines, and string marks, precisely similar to those on the vessels found at Vinelz.

As a further contribution to the subject, we have the prehistoric graves at Chamblandes, near Pully, which, according to the late Morel-Fatio, who describes them (B. 377),* belonged to the lake-dwellers of the Stone Age. It appears that a cultivator, while digging the foundations of a house, came upon a series of ancient graves, at a depth of six or seven feet, formed of four flags set on edge, with a fifth as a covering. Along with each skeleton were found 40 flakes of the tusks of the wild boar, pierced at each extremity. In one a marine shell, also pierced by two holes, was noted. In the following year further discoveries of similar graves were made in the same place, and this time their contents were more carefully examined. The sides were formed of four flags set on edge with an additional one as a covering. On the average these cists measured a mètre in length, and half this in breadth and depth, but one or two of smaller dimensions were noted. When a single skeleton was found it always lay with the feet towards the east. One, however, contained four skeletons, and in this case the heads were in the four corners. About the position of the breast some 40 doubly-perforated boar's teeth were found, which must have been attached to the garments. Besides these there were some perforated shells and two portions of colouring matter, one yellow and the other red. Another tomb contained a complete skeleton, and on the neck lay five doubly-perforated marine shells, while near the head were four pieces of yellow and red colouring matter, and two amulets of human skulls. Dispersed in this grave were beads which looked like amber, but, according to some, were coral. One grave contained a spherical hammer-stone, slightly flattened; another had a perforated and beautifully made axe of serpentine, 6½ inches long; and a third, that of a child (27 inches by 13), had three small, flat, and circular pebbles, like unperforated spindle-whorls, placed in the form of a triangle, and at one of the corners of the grave were some charcoal and fragments of burnt bones.

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* See also *Anzeiger*, 1880, p. 46; and 1882, p. 221.

According to Mr. Morel-Fatio everything found in these graves had their exact analogues in the early lake-dwellings such as Chevroux. Not far off, at Pierra-Portay and Châtelard sur Lutry, other burials of the Stone Age were discovered, which also, in his opinion, belonged to the Lake-dwellers (*Lacustres*).

IV.—IRON AGE.

In reviewing the salient features of the Iron Age we have still more complicated problems to deal with. There are, in reality, no lake-dwellings of the early Iron Age in Central Europe, showing a Transition period, as we have seen to have been the case between the Stone and Bronze Ages; nor, indeed, any which can be said to have a continued sequence to the great system of pile-dwellings which prevailed so extensively in earlier times. No doubt iron shows itself in a few objects characteristic of the Bronze Age, such as a few swords and bracelets encrusted with ornamental bands of this material, but there are no tools or weapons made of iron at all analogous to those which characterise the Bronze Age. No Transition period such as we find in the relics from the graves at Hallstadt, where iron is seen, as it were, competing with bronze. On the contrary, in the Swiss lake-dwellings iron-working appears in a state of great perfection. The few objects found on their sites are mostly of the La Tène type, which we have seen to be entirely different in character, manufacture, and style of ornamentation, from anything known in the previous ages. In some stations we find not only La Tène types, but Roman tiles, pottery, and coins, and even objects of a still later period, such as Gallo-Roman, Allemanisch, and Merovingian remains. Thus, at Starnberg, we have of iron, two spear-heads, a horse-shoe, and a remarkable kind of knife (**Fig. 37**, No. 1). In the investigations conducted during the winter of 1864–5 in the Überlingersee, Dr. Lachmann records the following iron objects from the bronze station of Unter-Uhldingen:—one lance-head, five arrow-points, one axe, two chisels, 12 knife-blades, two sickle-like objects, one dagger-knife, one ring, one triangular plate with attached ring, one fibula, one pin, part of a two-edged sword, a short sword with a wooden handle, a fork, a stamp, a pair of pincers, etc.—in all 40 objects. Also at Sipplingen there were three arrow-heads, two sickles, one lance-head, a one-edged sword, and a Roman key. In the Museum at Friedrichshafen are several objects of iron taken from Uhldingen, viz. two knives like pruning-hooks (*hippen*), a hammer-hatchet, a fibula (La Tène) 9 inches long, two harpoons, several arrow-heads, six horse-shoes, one dagger, and a girdle-hook. Still more interesting are fragments of fine glass found on both these stations, as well as at the Rauenegg in the Bay of Constance. One bit of this glass, of a grey greenish colour, had been ornamented with gold enamel. According to the opinion of Mr. Hofrath Klemm, of Dresden, this glass belongs to the sixth or seventh century. (B. 378.)

In Lake Zürich on the station of Grosser Hafner were found an iron spear-head like those from La Tène, Roman tiles, and pottery of the kind known as terra sigillata, and coins of the time of Augustus, Tiberias, and Vespasian, etc., thus bringing the station down to the end of the first century of the Christian era. From Nidau and Sutz there are some curious iron spear-heads, and from Chevroux a three-pronged harpoon identical with analogous objects from La Tène (**Fig. 13**, No. 15). Moeringen has yielded an iron horse-bit, an iron sword (La Tène), a curious iron fork, etc. On the south side of St. Peter's Island, in the Lake of Bienne, Colonel Schwab found among some piles objects of the stone, bronze, and Gallo-Roman periods, together with 40 Roman coins. From the same place there is in the Berne Museum an iron hatchet with a wooden handle of the La Tène type (**Fig. 197**). On several stations in Lake Neuchâtel similar objects have occasionally turned up. In Lake Morat iron objects and Roman remains were found at

Greing, Faoug, Guevaux, and Motier. Also a knife, the blade of which was partly of iron and partly of bronze (**Fig. 14,** No. 1).

Iron objects have also been occasionally found on a few stations in the Lake of Geneva, as at Plongeon and Morges; from the latter of which Dr. Forel records a number of sickles of various forms, some of which were like those of La Tène. In Lake Bourget a knife with a bronze handle and an iron blade (International Congress, Paris, p. 266), and a piece of pottery with the name *Severinus* stamped on it. (B. 176, p. 24.) In the Museum of Chambery there is a large spear-head of iron encrusted with broad lines of copper or bronze from this lake (**Fig. 198**) which is very similar to one found near the Pont de la Thiele.

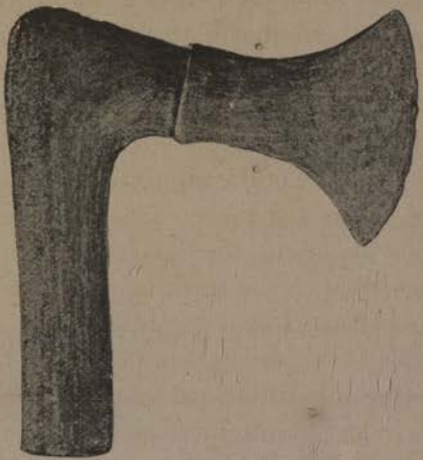

Fig. 197.—Iron Axe with portion of Wooden Handle (⅓).

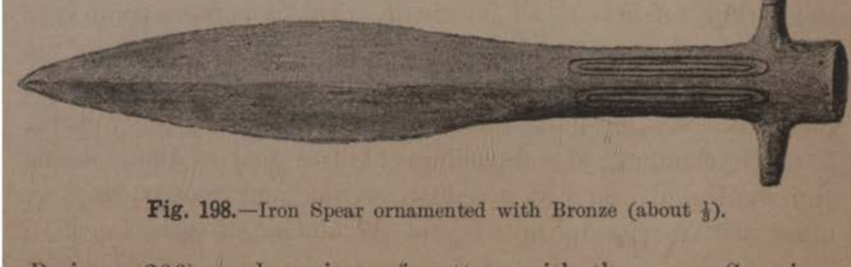

Fig. 198.—Iron Spear ornamented with Bronze (about ⅓).

But in all these instances the occurrence of iron is so exceptional that only probable deductions can be founded on them. Most of the iron objects have undoubtedly the same origin as those of La Tène. The rare bronze objects with encrusted iron bands, such as a few bracelets (Moeringen, Auvernier, Cortaillod, and Corcelettes), and one or two swords (Moeringen), need not cause surprise when we remember the extent to which commercial intercourse seems to have been carried on by the lake-dwellers with eastern nations; and that both iron and bronze were in use in Greece at least 1,200 years before the Christian era, while in Egypt and Central Asia these metals were known some 1,500 years earlier. Between those objects in which iron is used as an ornament (all of which are of the same style as the bronze objects), and the La Tène weapons, there is a wide gap which is not bridged over by any relics found in the lake-dwellings. In short, the evolutionary stage between the smelting of bronze and the forging of iron is here represented by a corresponding *hiatus* between the styles of art of the two periods more striking than that which distinguishes the neolithic from palæolithic industrial remains.

So far as I have looked into these matters I can only conclude that, with the introduction of iron into general use in Switzerland, we have a new people who conquered and subjugated the lake-dwellers and gave the death-blow to their system of lake-villages. Henceforth these villages fell into decay, and in the general destruction which ensued these La Tène implements might have been introduced by the invaders. In Roman times there remained only the ruins of a few stations. One thing is clearly established, that the conquerors of the lake-dwellers had a full knowledge of the working of iron in all its phases. The important point here is not the date of the discovery of this metal, but that of its application to the manufacture of all weapons and cutting implements. It is not likely that an art so complicated and requiring so much metallurgical and technical skill as that of the smelting and forging of iron had a sudden origin; and consequently we must look for its birthplace and evolutionary stages elsewhere. The remarkable collection of weapons, implements, and ornaments found at La Tène, to which I specially directed attention in a previous lecture, gives us a striking picture of the metallurgical skill to which their owners had attained prior to any influences from Roman art. So important are these antiquities considered by archæologists that the name La Tène has now become a generic expression, and represents a special group which, both in form and style of ornamentation, cannot be confounded with any other, either Greek, Roman, Etruscan or Phœnician. Who were these new comers into Switzerland who so suddenly intruded themselves on the peaceful lake-dwellers? To this question there is no response from the skulls and other portions of human skeletons found at La Tène. Out of ten skulls submitted to Professor Virchow he found that five were brachycephalic and two dolichocephalic, while the other three had intermediate cranial indices. We must therefore fall back on the character of the antiquities; and for this purpose I place before you some typical examples of this remarkable group (**Fig. 199**) culled from various sources for the purpose of showing their complete identity with those from the oppidum La Tène. Having satisfied ourselves on this point I proceed to glance rapidly over the geographical area in which such objects are found, with the view of showing to what people they belonged.

In the course of making the high-road from Berne to the bridge of Tiefenau in 1849-50 the workmen came upon a large quantity of weapons and implements of iron which, though very much rusted and decayed, can be clearly identified as belonging to the La Tène group. These objects, now preserved in the Museum at Berne, consist of the *débris* of arms, coats of mail, chariots, bridle-bits, bones of horses, pottery fine and coarse, some thirty pieces of money (*massaliotes et celtiques*), glass beads, iron and bronze buttons, sickles, knives, hatchets, etc. These objects, which were all mixed together in a miscellaneous manner, some two or three feet below the surface, had no appearance of ordinary burial, and are therefore considered to be the huddled up *débris* of a battle-field. The objects, so far as they can be made out, are described and figured by Baron de Bonstetten in his "Supplément au Recueil d'Antiquités Suisses, 1860," and "Notice sur les Armes et Chariots de Guerre découverts à Tiefenan, 1851."

During the excavations for the "Correction des Eaux du Jura," some remarkable discoveries were made, especially while deepening and rectifying the lower Thielle between Nidau and Meyenried. Immediately below the village of Port the *débris* of a pile-village was encountered, to which I have already alluded. Above this village the dredgers came in contact with a row of piles which Dr. v. Fellenberg concluded to have been the supports of a bridge. These piles were from 8 to 12 inches thick, and near them were collected over 100 weapons of the La Tène types, including swords,

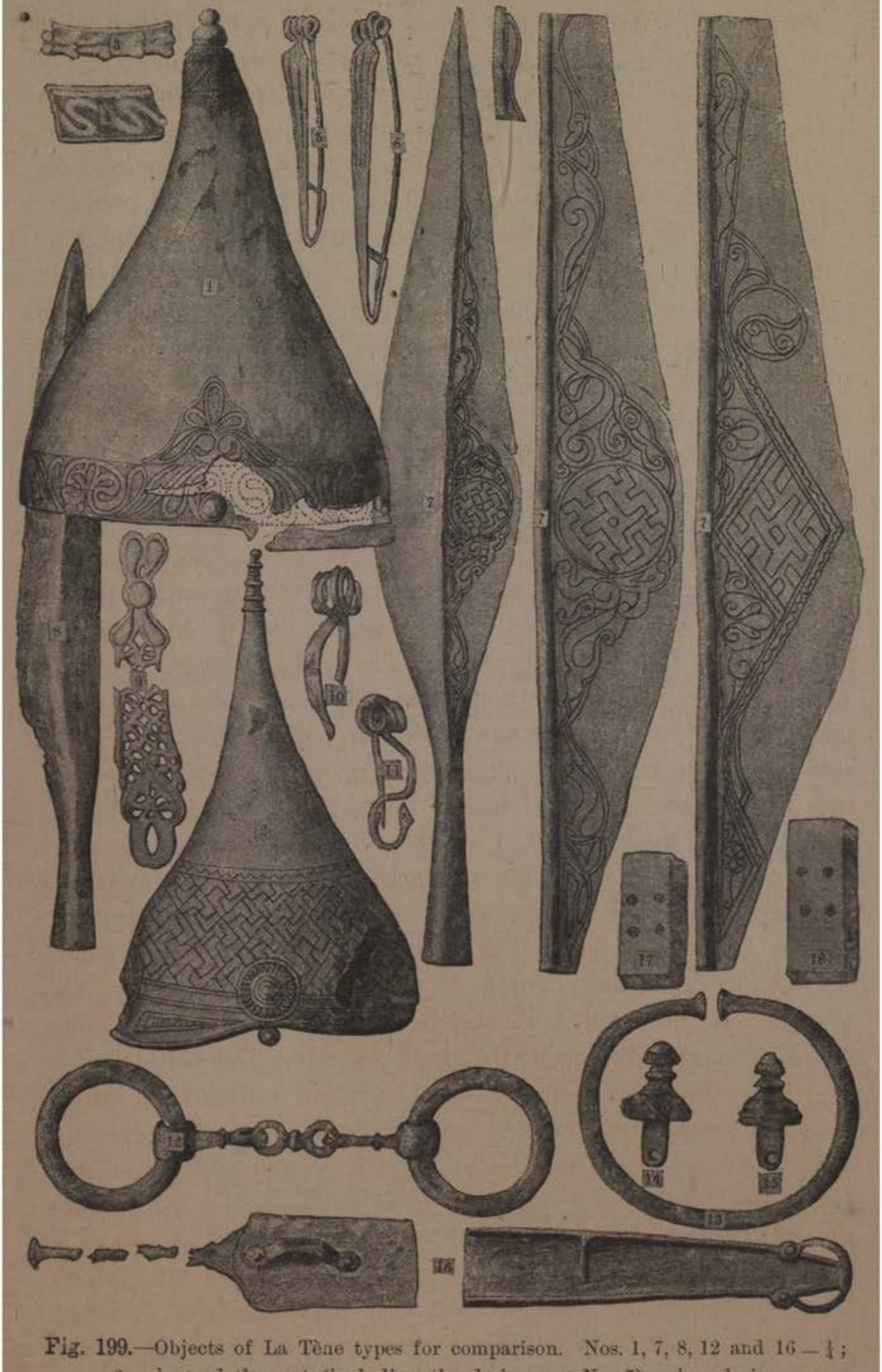
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Fig. 199.—Objects of La Tène types for comparison. Nos. 1, 7, 8, 12 and 16 — $\frac{1}{4}$; $2 = \frac{1}{6}$; and the rest (including the designs on No. 7) $= \frac{1}{2}$ real size.

spears, etc. Another locality was a little below Brügg, where traces of two bridges were encountered, one of the Gallo-Roman period and the other supposed to be of later date. Near the former a large collection of antiquities was made, including objects, not only of the La Tène type, but also others of Etruscan and Roman origin. Amongst the La Tène objects collected during these operations are swords and sheaths (one of the latter being of bronze), spear-heads, axes, sickles, etc., which are identical with those figured from La Tène. One of the spear-heads is ornamented with incised lines producing two designs, one on the right side of each surface, as shown in **Fig. 199**, No. 7.

In France similar antiquities have been collected on the Helvetico-Romano battle-fields, such as Alise St. Renne (Alesia of Cæsar), and Mont Beuvray (Bibracte), as well as in some graves in northern France, particularly in the valleys of the Marne and the Aube. Some of these graves were evidently the final resting place of Gaulish chiefs, and contained in addition to the body a complete suite of military equipments. For comparison I have given here some illustrations of these discoveries. No. 1 represents the famous bronze helmet known as the Casque de Berru, described by Bertrand, which is particularly interesting on account of the ornamental designs which it displays.* No. 2 is a similar helmet ornamented with a kind of fretwork, and along with it in the same grave were a great many objects, weapons, ornaments, the bronze mountings of horses' harness, and the *débris* of a chariot.† A few of these are here illustrated, viz. an iron spear (No. 8), a sword and its sheath both of iron (No. 16), two bronze fibulæ (Nos. 10 and 11), a gold bracelet (No. 13), a bronze horse-bit (No. 12), and some specimens of mountings for a chariot (Nos. 14 and 15), and harness (No. 9).

Characteristic finds of this period have also been found in Savoy, the Alpine Passes, and North Italy. In the Museums of Bologna, Este, Milan, Turin, etc., are deposited the contents of numerous warrior-graves, which show unmistakable examples of the characteristic swords and scabbards and other objects of La Tène civilisation. Its central home, however, appears to have been the middle and upper Rhine districts, Baden, Bavaria, and eastwards to Bohemia and Laibach. Northwards sporadic examples are found as far as the Baltic.

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* *Archéologie Celtique et Gauloise*, p. 368.

† *Double Sépulture Gauloise de la Gorge-Meillet* (*Marne*). By Ed. Fourdrignier. Paris, 1878.

One of the most important finds of this character in Europe was discovered, investigated, and described some ten years ago.* Near the village Stradonic in Bohemia there is a truncated eminence known under the name "der Berg Hradischt," which, owing to the precipitous nature of its slopes, is only accessible on one side. By nature this rocky eminence is admirably adapted for a military camping place, and that it was occupied in such a capacity in prehistoric times is evident from the mass of industrial remains of all ages found at various depths on its summit. Among these, however, by far the largest number were of the La Tène type, including a large quantity of money precisely similar to that found on La Tène. Gold pieces were particularly numerous, some 200 being found in one place. Others were of silver and potin, some imitating the coins of Philip of Macedon, and others bearing impressions of the fantastic horse with the long tail and horn (**Fig. 92,** Nos. 5 to 8). Roman coins were also present, but very sparingly. Among industrial and ornamental remains were fragments of glass bracelets of a yellow, blue, or red colour (Nos. 3 and 4), pincers, torques, grotesque figures of animal heads, iron axes, bridle-bits, etc. Upwards of 100 dice pieces of bone (Nos. 17 and 18). The characteristic fibulæ were of iron and bronze, the former, however, predominating. I have here placed side by side two bronze fibulæ precisely alike except in dimensions, one (No. 5) being from La Tène and the other (No. 6) from Hradischt. The former is after Vouga (B. 428, Pl. xvi. 17), who describes it as of the Hallstadt type, and probably of an older date than the ordinary La Tène objects. The presence of two objects so similar in style and ornamentation in such distant localities not only proves that they are forms of fibulæ then prevalent, but also becomes a striking confirmation of the contemporaneity of oppidum La Tène and the occupation of the camp on Hradischt. That they were the same people who occupied both places there can be little doubt.

The repeated incursions of the Gauls into North Italy, prior to its conquest by the Romans, so often referred to in classical writers, have been strikingly confirmed by recent archæological researches. In the cemeteries of Benacci, Villanova, and Marzabotto, in the vicinity of Bologna, the Gallic element has been for some time recognised by many of the most competent archæologists. During the excavations at Benacci three series of graves were observed, at different depths, the contents of which clearly prove that they were the cemeteries of different races. The first, or uppermost, were burials of the Roman period. Underneath them was a group of twelve graves which, from the long iron swords and characteristic fibulæ found along with the bodies, are now universally accepted as Celtic or Gaulish. Below these, again, was a third group which in every respect corresponded with the Etruscan cemetery of Villanova.* Helbig assigns the date of the Celtic graves at Marzabotto to the end of the fifth or beginning of the fourth century B.C. (B. 335, p. 35.)

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* W. Osborne, *Zur Beurtheilung des prähistorischen Fundes auf dem Hradischt bei Stradonic in Böhmen. Mitt. der Anth. Ges. Wien*, vol. x.

In 1878 Castelfranco investigated a cemetery at Soldo, in the Brianza district, in which, among other things, he found the following relics:—A bronze fibula and an iron knife, precisely similar to those here figured from the Starnberg lake-dwelling (**Fig. 36**, No. 22, and **Fig. 37**, No. 1); an iron shears like those from La Tène; a Celtic silver coin; a vase with the word VITILIOS scratched on it in rude *graffiti*, which Fabretti ascribes to a Celtic source (" La direi celtica per la desinenza, come pure per la forma del T "). See B. 343, pp. 6 to 28, and Pl. i.

More recently (1886) the same author described several groups of cemeteries scattered over Lombardy, particularly on the left side of the Po, in which he found characteristic examples of the La Tène civilisation—swords, spears, knives, fibulæ, saws, shears, nodulated rings, etc.†

During the earlier discoveries of objects of this peculiar phase of art there was considerable diversity of opinion as to the people and period to which they should be referred. The Tiefenau " find " was assigned by Mr. Albert Jahn to the old Helvetians (" Canton Bern "), while Baron de Bonstetten referred it to the German races who invaded Helvetia in the fourth century. M. Veschère de Reffye, in describing the discoveries at the ancient fortress of Alesia, assigned the weapons found in the trenches, which turned out to be of the same character as those of La Tène, to the Helvetians.* Acting on this suggestion, Desor expressed the opinion that the La Tène iron weapons and other implements were introduced into Switzerland by the Helvetians, who hailed from Germany, and entered the country as conquerors. Dr. Keller, apparently prejudiced by his preconceived notion that the lake-dwellings of the Stone and Bronze Ages were due to the Celts, had a difficulty in believing that the advanced civilisation of La Tène was a direct evolutionary product of the Bronze Age; but yet he would not agree with the opinion that these civilisations indicated different races.

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* *Bull. dell' Inst.*, 1875, pp. 50 and 178, and 1877, p. 74.

† *Bull. Palet. It.*, anno xii., p. 194, etc., with six plates.

But perhaps the most important contribution to the subject was by Mr. Franks,† who demonstrated by an analysis of the style of ornamentation, together with an array of historical references bearing on the customs of the ancient Celtic races, that to them alone must be assigned the remarkable remains now in question. The few additional notices of later discoveries here introduced only strengthen this opinion. In my investigations of the British lake-dwellings, almost the only instance in which analogous remains have come to light is the "find" at Lisnacroghera; but the prevalence of such antiquities in Britain from about the second century B.C. till the introduction of Christianity, when the spiral and trumpet-shaped ornamentation became modified, and to a considerable extent superseded, by the addition of interlacements, has been so fully established by Mr. Franks that on this point nothing remains to be said.

From these remarks you see that we are among the class of antiquities (described and illustrated in "Horae Ferales") to which Mr. Franks has given the name "Late Celtic." The owners of these La Tène weapons in Switzerland were the Helvetians, of Roman celebrity, who, according to Cæsar, were a branch of the great Celtic family who so long dominated over the rest of the Aryan races, and whose civilisation is only now in its death struggle in the outlying districts of Western Europe. Who these Celts were is a question which still puzzles historians, philologists, and archæologists. The term "Late Celtic" is sufficiently clear, and, as we have seen, accurately defines a most remarkable group of antiquities; but it necessarily involves a counterpart, viz. an "Early Celtic" period, in regard to which no archæologist has offered any opinion beyond mere conjecture. Before my rambles among the ruins and relics of the lacustrine villages I had no reason to doubt the correctness of the opinion advanced and promulgated by the late Dr. Keller, viz. that the early lake-dwellers belonged to the Celtic race. I do not think that archæology supports this opinion. If the "Late Celtic" relics correctly represent the Celts of that period they must have been a large-bodied race, wielding great swords with massive grips, totally out of keeping with the small-handed weapons of the Bronze Age as found on the sites of the lake-dwellings. The few indications derived from the data supplied by lake-dwelling research suggest the idea that the evolution of the Celts in Europe coincides with the substitution of iron for bronze in the manufacture of the more important cutting implements and weapons, and that the earlier stages of this transition are to be found considerably to the east of the Rhine districts—as, for example, at Hallstadt.

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* *Revue Archéologique*, 1864.

† "Horæ Ferales," pp. 172 to 189.

In hazarding an opinion as to the original founders of the lake-dwellings in Central Europe I would say that they were part of the first neolithic immigrants who entered the country by the regions surrounding the Black Sea and the shore of the Mediterranean, and spread westwards along the Danube and its tributaries till they reached the great central lakes. Here they founded that remarkable system of lake-villages whose ruins and relics are now being disinterred as it were from another or forgotten world. Those following the Drave and the Save entered Styria, where they established their settlements on what was then a great lake at Laibach. From this they crossed the mountains to the Po valley, where they founded not only the pile-villages, but subsequently the terremare. The Danubian wanderers having reached the upper sources of the Danube, crossed the uplands by way of Schussenried, and arrived on the shores of Lake Constance, from which they quickly spread over the low-lying districts of Switzerland. From Lake Neuchâtel, still continuing a westward course, they reached the Rhone valley by way of Morges, where they erected one of their earliest and largest settlements. From the Lake of Geneva they had easy access to the lakes of Annecy and Bourget.

It is worthy of note that almost the only historical notices of the habit of constructing lake-dwellings which have come down to us refer to districts along this supposed route. The following quotation from Herodotus (v. 16) gives a vivid description of a lake-village which flourished some 500 years before Christ. The Lake Prasias here referred to is situated in the south of Roumelia, not far from the mouth of the river Strymon, and the rather remarkable fact which is here recorded shows that its lake-dwellers were so powerful as to successfully defy the resources of a Persian army.

> "They, on the other hand, who dwelt about Mount Pangæum and in the country of the Doberes, the Agrianians and the Odomantians, and they likewise who inhabited Lake Prasias, were not conquered by Megabazus. He sought, indeed, to subdue the dwellers upon the lake, but could not effect his purpose. Their manner of living is the following:—Platforms supported upon tall piles stand in the middle of the lake, which are approached from the land by a single narrow bridge. At the first the piles which bear up the platforms were fixed in their places by the whole body of the citizens; but since that time the custom which prevails about fixing them is this: they are brought from a hill called Orbelus, and every man drives in three for each wife that he marries. Now the men have all many wives apiece, and this is the way in which they live. Each has his own hut, wherein he dwells, upon one of the platforms; and each has also a trap door giving access to the lake beneath; and their wont is to tie their baby children by the foot with a string, to save them from rolling into the water. They feed their horses and their other beasts on fish, which abound in the lake to such a degree that a man has only to open his trap-door and to let down a basket by a rope into the water, and then to wait a very short time, when up he draws it quite full of them."

Another reference to lake-dwellings occurs in a passage by Hippocrates ("De Æribus," etc., xxxvii.), and the locality to which the remarks were applied lies to the east of the Black Sea.

> "Concerning the people of the Phasis, that region is marshy and hot, and full of water, and woody; and at every season frequent and violent rains fall there. The inhabitants live in the marshes, and have houses of timber and of reeds constructed in the midst of the waters; and they seldom go out to the city or the market, but sail up and down in boats made out of a single tree-trunk, for there are numerous canals in that region. The water they drink is hot and stagnant, putrefied by the sun, and swollen by the rainfall, and the Phasis itself is the most stagnant and quiet-flowing of all rivers."

In the works of recent travellers I find statements corroborating the opinion already published by Dr. Keller (B. 119, 2nd ed., p. 666), that the remains of lake-dwellings have been detected in Asia Minor, more especially in the Caucasus and the region between the Black Sea and the Caspian. As early as 1849 Bayern discovered palafittes in Lake Gok-chai and in Lake Paleostrum, not far from the embouchure of the Rion (Phasis). Mr. Chantre states that on the lowering of Lake Toporovan, near the village of Choucha at the embouchure of the Koura, and in some other lakes on the coast of the Black Sea, indications of their existence have been observed.* None of these have, however, been sufficiently explored to be of archæological value.

While the lake-dwellers of Switzerland were quietly living in the peculiar habitations which the hydrographical conditions of the country enabled them to develop so largely, great and progressive changes were going on elsewhere among the neolithic settlers in Europe. Probably other immigrants soon found their way to the far west, and brought with them a knowledge of bronze. As time rolled on, considerable divergences from the primitive civilisation took place, partly the outcome of geographical and climatal conditions, and partly the result of innovations by freer intercourse with the inhabitants of the shores of the Mediterranean. Then were laid gradually the germs of the historical nationalities of Europe. Just at the dawn of history we find the Celts, not in the sunshine of their power, but with faded strength and departed glory, confined to a limited area in Europe. After the collapse of the great lake-villages it is not singular to find that a knowledge of the system remained among the surrounding nationalities which subsequently germinated into activity in various sporadic corners, and produced not only the Scottish and Irish crannogs, but the analogous remains in Friesland, North Germany, Paladru, etc. As the great extinct mammals are known to have lingered in the recesses of mountain ranges and other secluded localities, so the artificial islands or crannogs and other lake-habitations of the Iron Age are but the deteriorated remnants of a doomed system which, like every dying art before final extinction, passed through a stage of decay and degeneration.

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* "Recherches Anthropologiques dans le Caucase," vol i. p. 70.

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